SOIL SURVEY OF

Estill and Lee Counties, Kentucky

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
Kentucky Agricultural Experiment Station

Issued August 1974

Major fieldwork for this soil survey was done in the period 1958–68. Soil names and descriptions were approved in 1969. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1969. This survey was made cooperatively by the Soil Conservation Service, Forest Service, and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Estill and Lee Counties Soil Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Estill and Lee Counties are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and woodland groups.

Foresters and others can refer to the section "Woodland Uses of the Soils," where the soils of the survey area are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and for recreation areas in the section "Soil Interpretations for Town and Country Planning."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain estimates of soil properties and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in Estill and Lee Counties may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication and in the section "General Nature of the Area."

Cover: **Beef cattle and fenced farm pond in Estill County. The soil in the foreground is Cruze silt loam, 6 to 15 percent slopes.**

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE AND FOREST SERVICE, IN COOPERATION WITH THE KENTUCKY AGRICULTURAL EXPERIMENT STATION

ESTILL AND LEE COUNTIES are at the west-central edge of the Eastern Kentucky Mountains (fig. 1). Estill County has an area of approximately 260 square miles, or 166,400 acres. Lee county has an area of 210 square miles, or 134,400 acres.

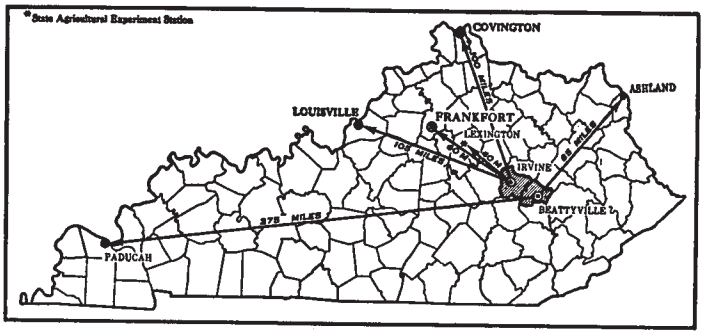

Figure 1.—Location of Estill and Lee Counties in Kentucky.

The economy of Estill and Lee Counties is based chiefly on petroleum, forest products, and farming. About 70 percent, or 116,480 acres, of Estill County is forested. Of this the Forest Service manages 4,816 acres. About 80 percent, or 107,520 acres, of Lee County is forested, and the Forest Service manages 7,052 acres. The acreages under Forest Service management are in the Daniel Boone National Forest.

The major physiographic region of the two counties is the Eastern Kentucky Mountains, which include all of Lee County and about two-thirds of Estill County. The topography ranges from mountainous to hilly. The Knobs region, a hilly area in the west-central and northwestern parts, makes up most of the rest of Estill County. A small part of the Outer Bluegrass region, a hilly area, is along the northwestern edge of Estill County. The largest area of important farming soils is along the flood plain of the Kentucky River, which extends across both counties, and its larger tributaries.

The climate is temperate and is favorable for many types of plants and animals.

Irvine, the county seat of Estill County, and Beattyville, the county seat of Lee County, are the major trade centers. Both cities have a few small industries.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Estill and Lee Counties, where they are located, and how they can be used. The soil scientists went into the two counties knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Huntington and Shelocta, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Shelocta silt loam, 6 to 12 percent slopes, is one of several phases within the Shelocta series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other

kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Estill and Lee Counties: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. An example is Latham-Shelocta complex, 20 to 30 percent slopes.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Shelocta and Jefferson stony soils, 20 to 60 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Alluvial land, steep, is a land type in Estill and Lee Counties.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Estill and Lee Counties. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The seven soil associations in Estill and Lee Counties are described on the following pages. Soil association names and delineations on the general soil map of these two counties do not fully agree with those of the general soil maps in adjacent counties published at a different date. Differences in the maps are the result of improvements in the classification or of refinements in the concepts of soil series. In addition, more precise and detailed maps are needed because the uses of the general soil map have expanded in recent years. The more modern maps meet this need.

1. *Fairmount-Shrouts-Allegheny association*

Strongly sloping to steep, shallow and deep, well-drained soils on sides of deep, V-shaped valleys; and gently sloping to strongly sloping, well-drained soils mostly on long, narrow ridgetops

This association is in a narrow, hilly area along the Kentucky River on the northwestern edge of Estill County and in a smaller area northwest of Wisemantown. The landscape is one of long, narrow ridgetops that break abruptly to strongly sloping or moderately steep side slopes. These slopes, in turn, break abruptly to steep slopes along drainageways, many of which flow directly into the Kentucky River (fig. 2). Many abrupt breaks in slope occur where there is a limestone outcrop or narrow cliff. Elevations between the ridgetops and the drainageways are about 200 feet.

This association occupies about 5 percent of the survey area. Fairmount soils make up about 53 percent of this association, Shrouts soils about 13 percent, and Allegheny soils about 10 percent. Soils of minor extent are the Colyer, Trappist, and Monongahela soils on uplands; the Elk, Captina, and Woolper soils on colluvial slopes and stream terraces; and the Huntington and Bruno soils on flood plains.

The Fairmount soils are strongly sloping to steep, are shallow over limestone bedrock, and have a flaggy, clayey surface layer. They are mostly the middle and lower slopes.

Shrouts soils are strongly sloping to steep and are shallow over a massive clay layer. They are on upper and middle slopes. Allegheny soils are gently sloping to strongly sloping and loamy and are mostly on ridgetops.

About half of this association is wooded. The land farmed is on ridgetops and upper slopes and along stream flood plains, terraces, or colluvial areas. Tobacco, hay, and

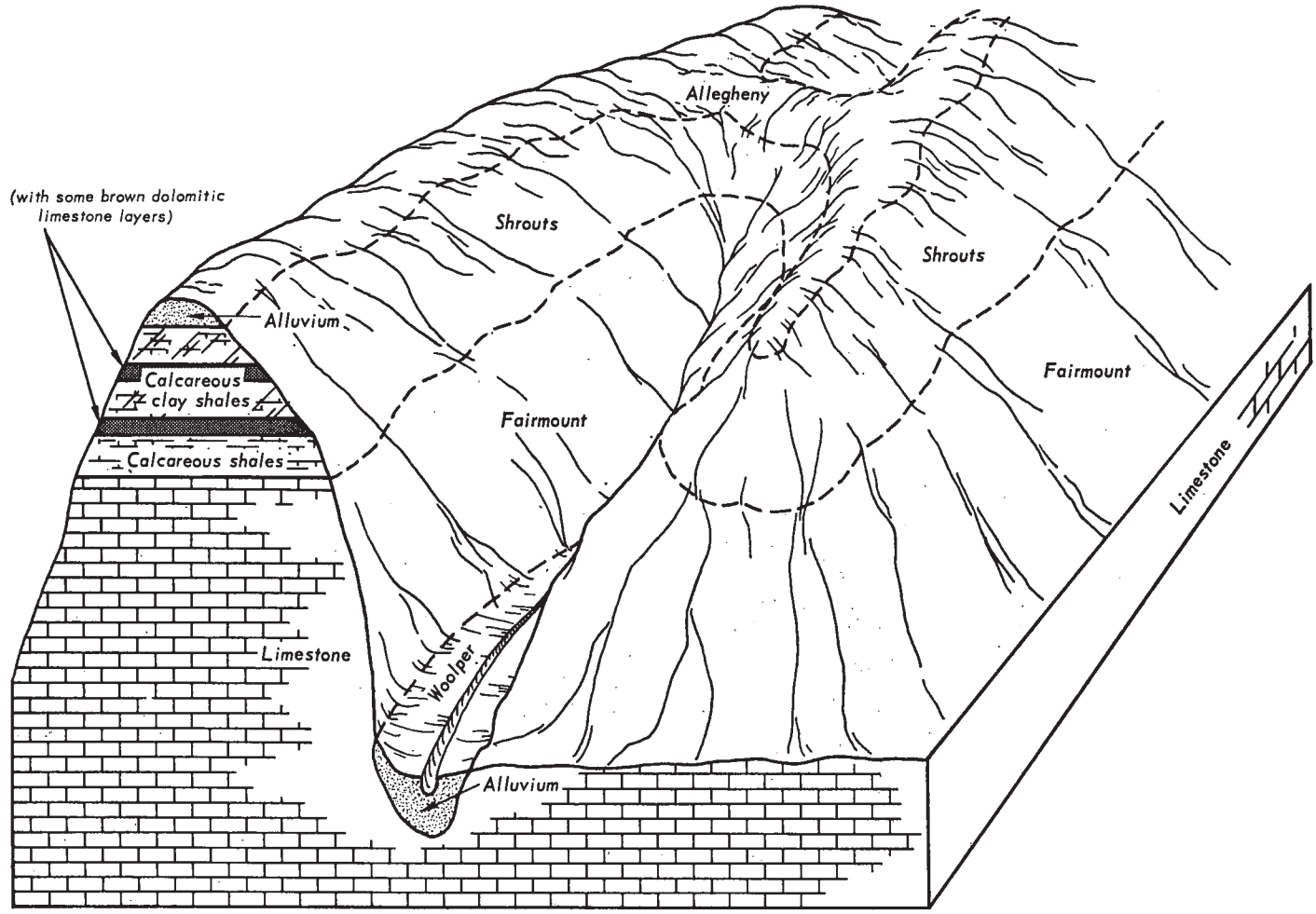

Figure 2.—**Pattern of soils and underlying material in the Fairmount-Shrouts-Allegheny association.**

pasture are the main crops. Some corn is grown, mostly along flood plains. Raising of beef cattle is the main livestock enterprise. Hogs are raised on a few farms

2. *Colyer-Shrouts-Allegheny association*

Sloping to steep, shallow and moderately deep, well-drained and excessively drained soils on the sides and tops of very narrow ridges; and gently to strongly sloping, deep, well-drained soils mostly on long, narrow ridges

This association is in the west-central and northwestern parts of Estill County. It extends from Irvine to near the Madison County line and north to the Clark County line. The landscape is one of narrow and very narrow ridgetops that gradually break to moderately steep or steep side slopes (fig. 3). Elevations between the ridgetops and the narrow flood plains along the many streams range from about 100 to 150 feet.

This association occupies about 15 percent of the survey area. Colyer soils make up about 50 percent of this association, Shrouts soils about 10 percent, and Allegheny soils about 9 percent. Soils of minor extent are the Fairmount and Trappist soils on uplands; the Muse, Cruze, and Woolper soils in colluvial areas; and the Newark, Lindside, and Melvin soils on flood plains.

The Colyer soils are sloping to steep, are shallow over black shale bedrock, and have a clayey, shaly subsoil. They occupy the very narrow ridgetops and side slopes.

Shrouts soils are strongly sloping to steep and are shallow over a massive clay layer. They are on lower slopes below Colyer soils. Allegheny soils are gently sloping to strongly sloping, deep, and loamy. They are mostly on ridgetops.

About 70 percent of this association is wooded. The land farmed is mostly ridgetops, upper side slopes, and stream flood plains. Some strongly sloping to moderately steep slopes are used for pasture. Tobacco, hay, and pasture are the main crops. Some corn is grown, mostly along flood plains. Raising beef cattle is the main livestock enterprise. Hogs are raised on a few farms.

3. *Huntington-Newark-Morehead association*

Nearly level, well-drained and somewhat poorly drained soils on flood plains and terraces of the Kentucky River and its large tributaries

This association is in long narrow areas adjacent to the Kentucky River and to Station Camp, Red Lick, Millers, and Cow Creeks. The landscape is one of flood plains along these streams, and of stream terraces, at a slightly

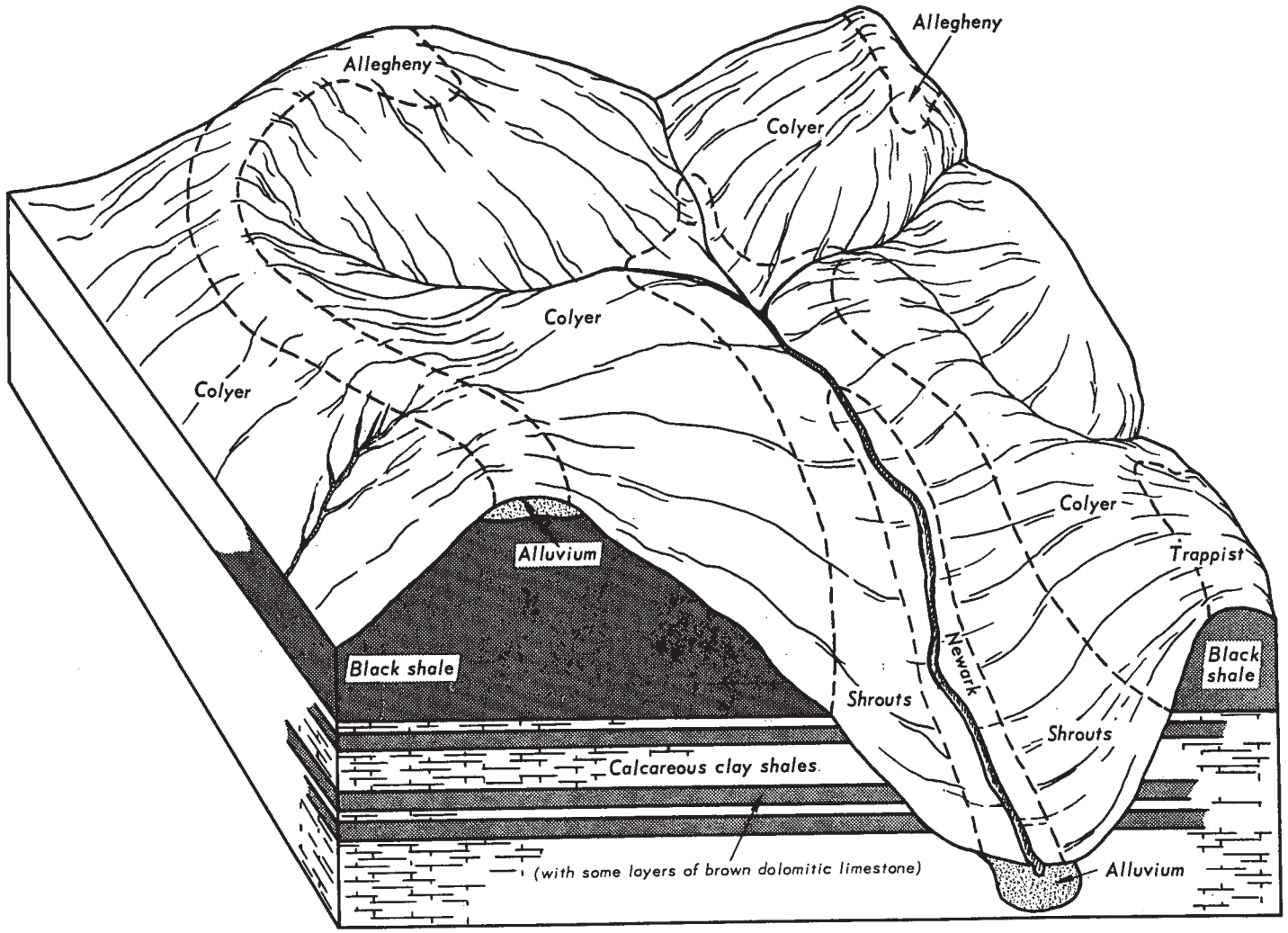

Figure 3.—**Pattern of soils and underlying material in the Colyer-Shrouts-Allegheny association.**

higher elevation, that rise abruptly from the level of the flood plains (fig. 4).

This association occupies about 5 percent of the survey area. Huntington soils make up about 20 percent of this association, Newark soils about 17 percent, and Morehead soils about 13 percent. Soils of minor extent are the Bruno, Lindside, and Melvin soils on flood plains; the Elk, Captina, Purdy, and Lanton soils on stream terraces; and the Muse, Shelocta, and Cruze soils on uplands.

The Huntington soils are deep, well drained, and loamy. They occupy flood plains and are mainly nearly level, but are gently sloping to strongly sloping where they occur on streambanks and natural levees.

Both Newark and Morehead soils are nearly level, somewhat poorly drained, and loamy. The Newark soils occupy flood plains, and the Morehead soils occupy low stream terraces.

Most of this association is used for general farming. Corn, hay, pasture grasses, and tobacco are the main crops. Beef cattle and hogs are the main livestock. Wetness is the chief limitation to use of these soils for crops. Most areas are subject to overflow.

4. Shelocta-Brookside-Latham association

Mostly steep, deep, well-drained soils on mountains; and sloping to moderately steep, deep, well drained and moderately well drained soils on ridge crests

This association is in the mountainous area of the southern and eastern half of Estill County and along the extreme western edge of Lee County. The landscape is one of steep mountainsides, long narrow ridgetops or ridge crests, and long narrow flood plains along streams (fig. 5). The mountainsides are divided by a nearly continuous limestone escarpment. Elevations between the ridgetops and the flood plains range from 400 to 600 feet.

This association occupies about 30 percent of the survey area. Shelocta soils make up about 33 percent of this association, Brookside soils about 26 percent, and Latham soils about 11 percent. Soils of minor extent are the Caneyville, Whitley, and Gilpin soils on uplands; the Captina and Morehead soils in colluvial areas and on stream terraces; and the Huntington, Lindside, and Newark soils on flood plains.

The Shelocta soils are moderately steep to steep, deep, well drained, and loamy. They are the lower slopes of

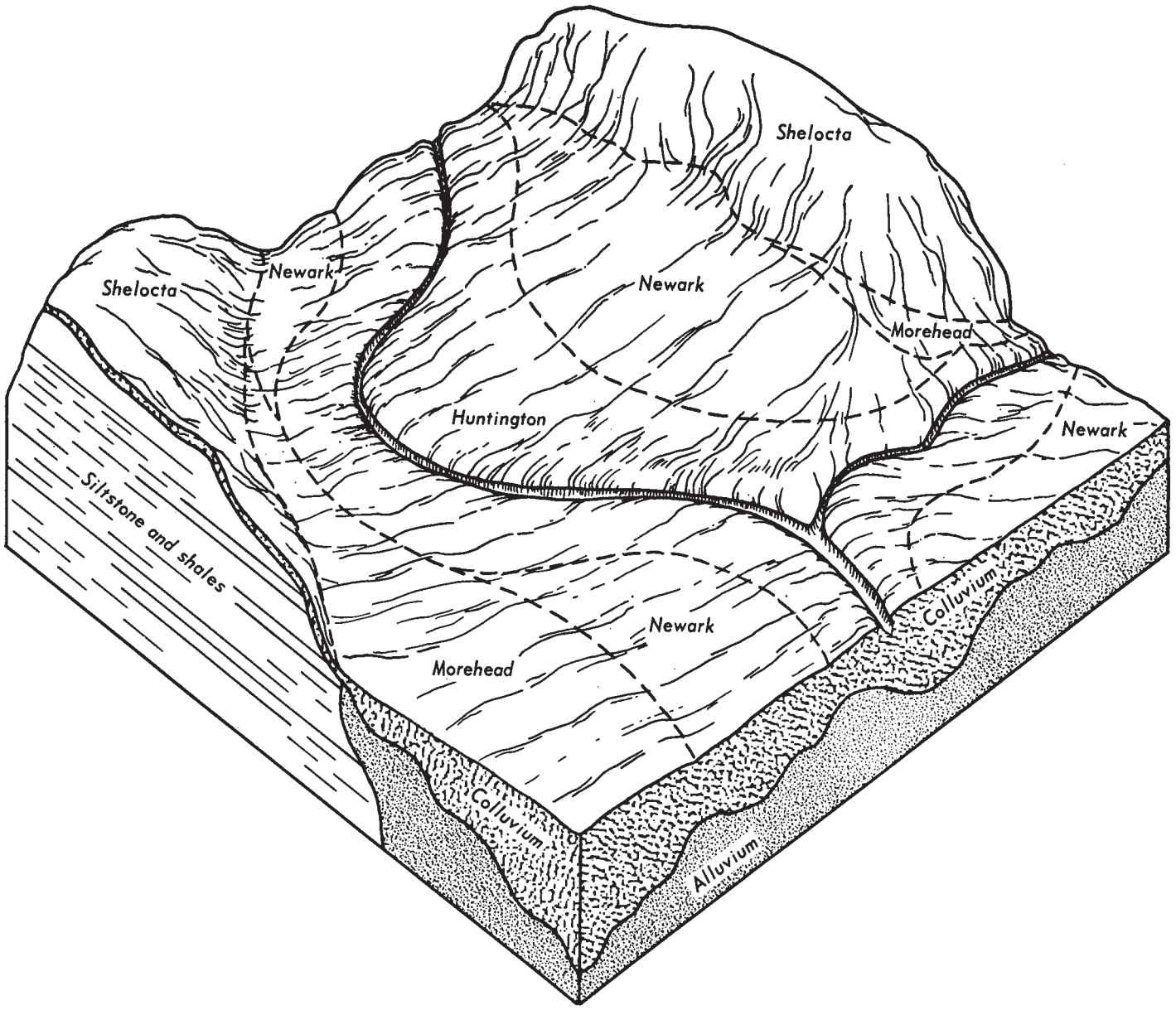

Figure 4.—**Pattern of soils and underlying material in the Huntington-Newark-Morehead association.**

mountainsides and are dissected by many small drainageways. In places they are intermixed with the higher lying Latham soils.

Brookside soils are steep, deep, and well drained and have a clayey subsoil. They are mostly above Shelocta soils and just below the nearly continuous limestone escarpments. Near the upper ends of drainageways they are on middle and lower slopes.

Latham soils are sloping to steep, deep, and moderately well drained to well drained, and they have a clayey subsoil. They occupy the tops and sides of ridges.

About 85 percent of this association is wooded. Most of the narrow branch bottoms are used for corn, hay, and pasture. Small patches are used for tobacco. A few ridgetops and upper slopes are used mainly for tobacco, hay, and pasture.

5. *Shelocta-Jefferson-Dekalb association*

Steep, deep, well-drained soils on mountains; and sloping to strongly sloping, moderately deep, well-drained soils on narrow ridgetops

This association is in the mountainous area at the northwestern edge of Lee County. The landscape is one of steep mountainsides, which are separated from long, very narrow ridgetops by a nearly continuous sandstone escarpment, and which descend to narrow branch bottoms (fig. 6). Elevations between the ridgetops and the branch bottoms range from 300 to 400 feet.

This association occupies about 3 percent of the survey area. Shelocta soils make up about 35 percent of this association, Jefferson soils about 18 percent, and Dekalb soils about 17 percent. Soils of minor extent are the Ram-

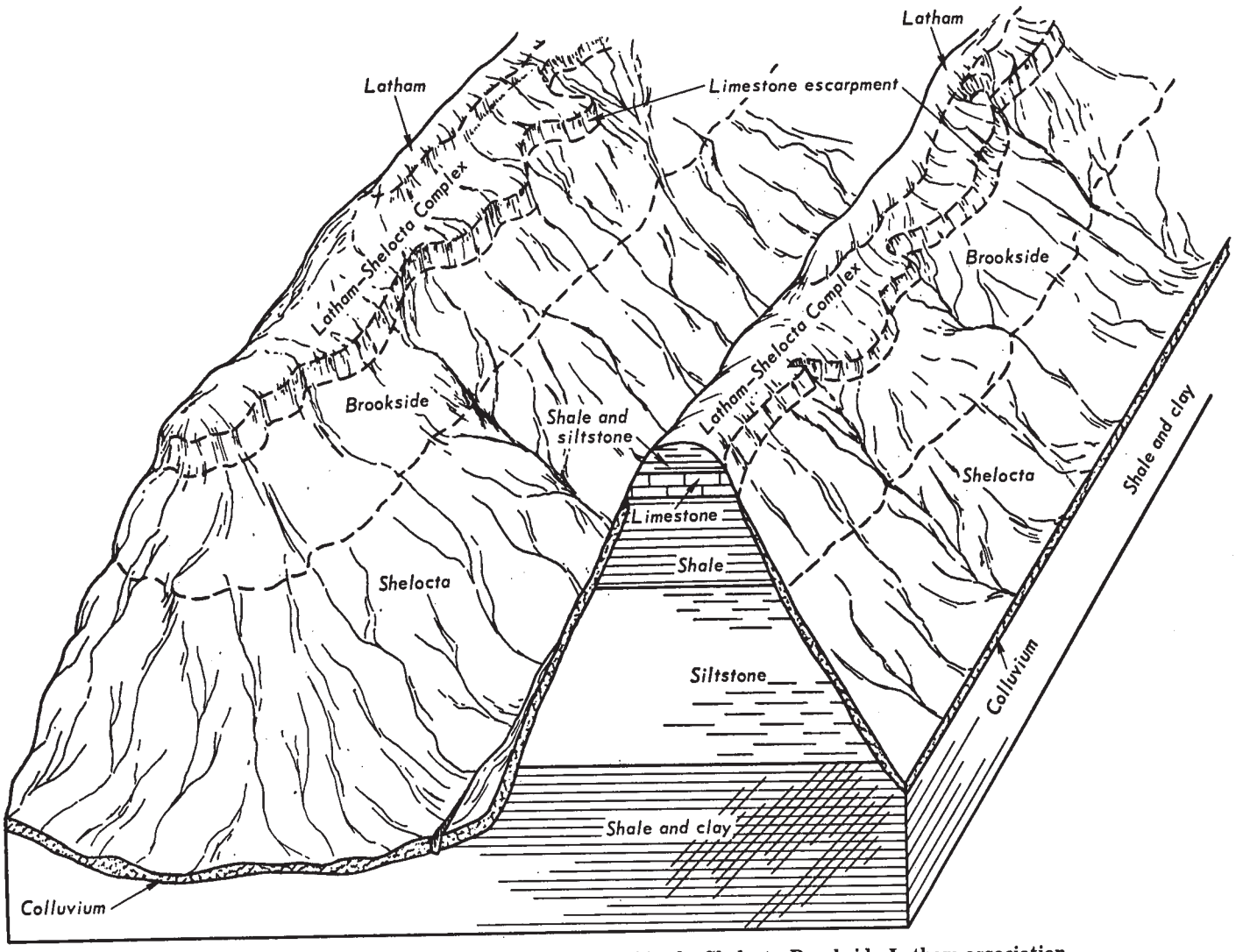

Figure 5.—**Pattern of soils and underlying material in the Shelocta-Brookside-Latham association.**

sey, Latham, Caneyville, Gilpin, and Whitley soils on uplands and the Stendal, Clifty, and Bruno soils on branch bottoms.

The Shelocta soils are mostly steep, deep, and loamy. They are the lower and middle slopes of mountainsides. In a few places they are sloping to strongly sloping and occupy colluvial areas below higher lying soils.

Jefferson soils are steep, deep, and loamy and have stones and boulders on the surface. They are the middle and upper slopes of mountainsides, adjacent to sandstone escarpments. Dekalb soils are sloping or strongly sloping, moderately deep, and loamy. They occupy ridgetops.

About 95 percent of this association is wooded. Some narrow branch bottoms, colluvial areas, and lower slopes are used for hay, pasture, and small patches of tobacco and corn.

6. *Shelocta-Latham-Jefferson association*

Steep and moderately steep, deep, well-drained soils on mountains; and sloping to steep, deep, moderately well drained to well drained soils on long, narrow ridgetops

This association is in the west-central and northwestern parts of Lee County. It extends from Yellow Rock on the south to Leeco on the north. The landscape is one of long, narrow ridges that gradually break to steep side slopes (fig. 7). Some of the many drainageways have long, narrow strips of bottom land. The sides are divided into upper and lower slopes by a discontinuous sandstone cliff. Elevations between the ridgetops and the branch bottoms range from 300 to 400 feet.

This association occupies about 12 percent of the survey area. Shelocta soils make up about 35 percent of this association, Latham soils about 24 percent, and Jefferson soils about 13 percent. Soils of minor extent are the Hartsells, Dekalb, Ramsey, Whitley, and Gilpin soils on uplands and the Stendal, Clifty, and Cuba soils on bottom land.

The Shelocta soils are mostly steep, deep, and loamy. They are the upper and lower slopes. In a few places they are sloping to strongly sloping and occupy colluvial areas below higher lying soils.

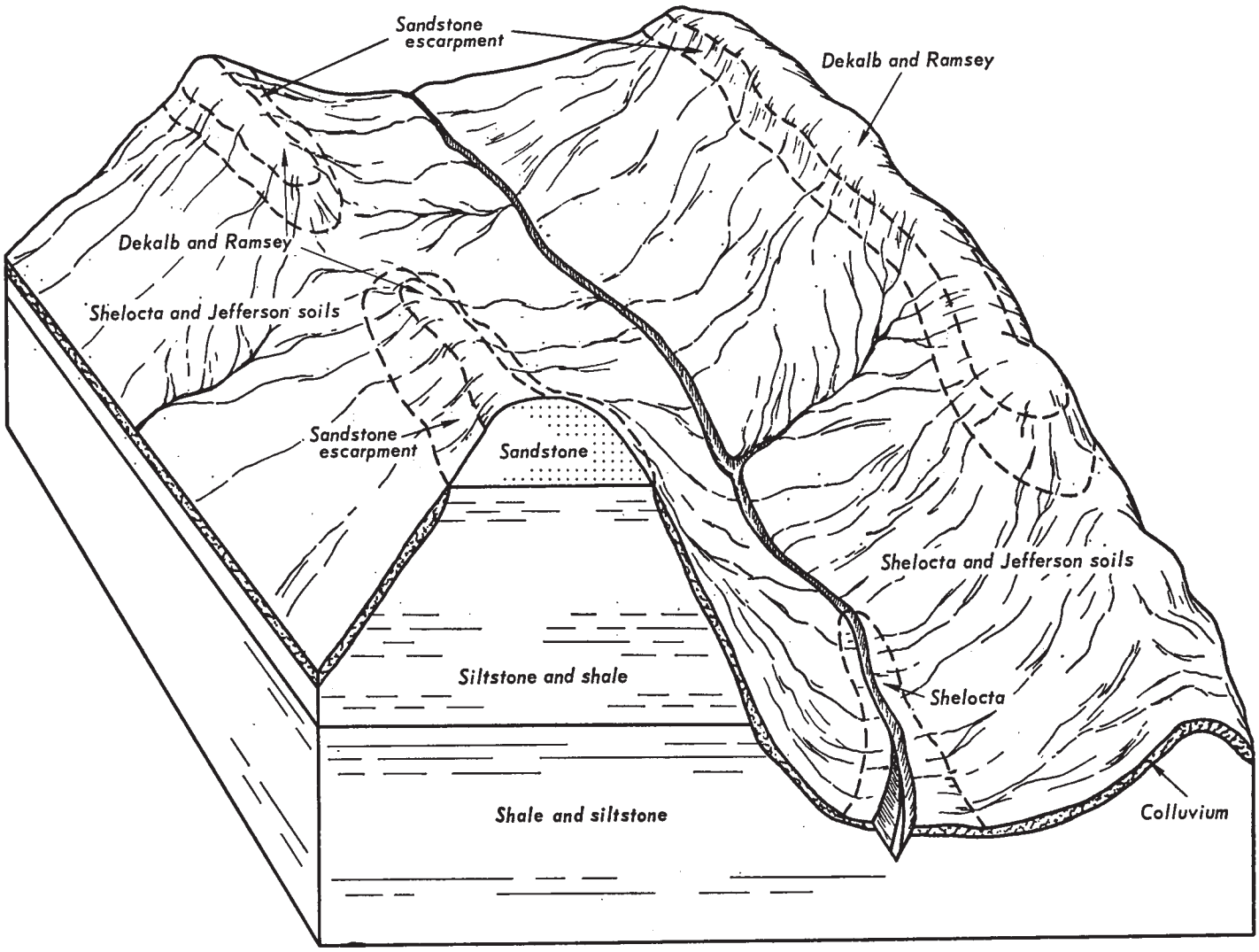

Figure 6.—**Pattern of soils and underlying material in the Shelocta-Jefferson-Dekalb association.**

Latham soils are sloping to steep, deep, and moderately well drained to well drained and have a clayey subsoil. They occupy ridgetops and are intermixed with the higher lying Shelocta soils. Jefferson soils are steep, deep, and loamy. They are intermixed with the lower lying Shelocta soils.

About 90 percent of this association is wooded. Some ridgetops, upper slopes, colluvial areas, lower slopes, and branch bottoms are used mostly for small patches of tobacco and corn and for hay and pasture.

7. *Latham-Shelocta-Gilpin association*

Sloping to steep, deep and moderately deep, moderately well drained to well drained soils on the sides and tops of ridges; and dominantly steep, deep, well-drained soils in colluvial areas

This association is in the southern and northeastern parts of Lee County. The landscape is one of long, narrow ridgetops or ridge crests; long, steep side slopes; and narrow flood plains and colluvial areas along the many streams (fig. 8). Elevations between the ridgetops and and the flood plains range from 150 to 300 feet.

This association occupies about 30 percent of the survey area. Latham soils make up about 47 percent of this association, Shelocta soils about 23 percent, and Gilpin soils about 5 percent. Soils of minor extent are the Whitley, Hartsells, Dekalb, and Ramsey soils on uplands; the Allegheny, Elk, Captina, and Morehead soils on stream terraces or colluvial slopes; and the Stendal, Bonnie, Cuba, Pope, and Clifty soils on flood plains.

The Latham soils are sloping to steep, deep, and moderately well drained to well drained and have a clayey subsoil. They are on side slopes and occupy some ridgetops.

Shelocta soils are sloping to steep, well drained, and loamy. They are intermixed with the Latham soils on side slopes and occupy colluvial areas and stream terraces. Gilpin soils are sloping to moderately steep, moderately deep, well drained, and loamy. They occupy the tops and sides of ridges.

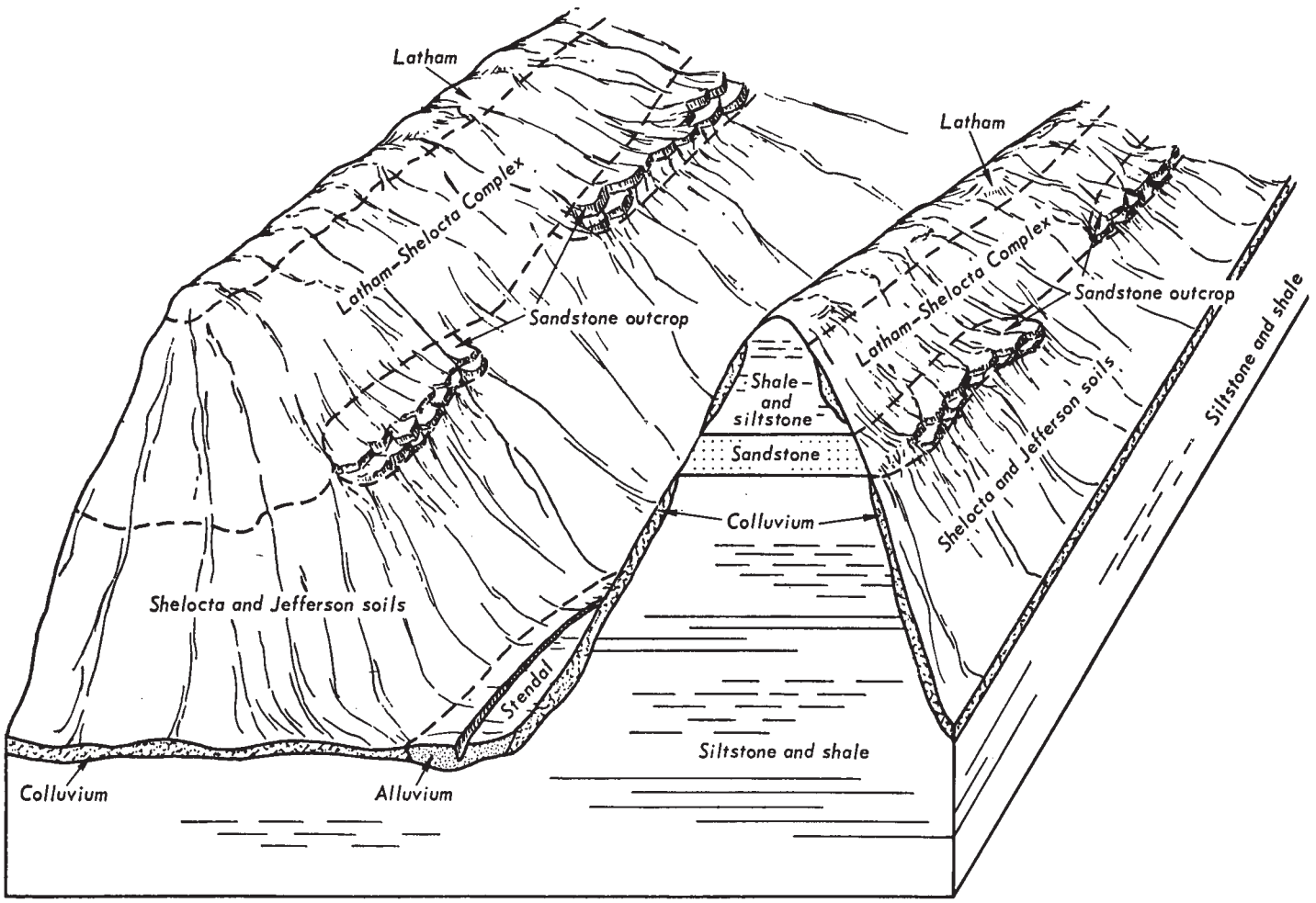

Figure 7.—**Pattern of soils and underlying material in the Shelocta-Latham-Jefferson association.**

About 75 percent of this association is wooded. Most flood plains and stream terraces along the Kentucky River, its tributary streams, and small branch bottoms and colluvial areas are used for corn, hay, pasture, and small patches of tobacco. Some ridgetops and upper slopes are used mostly for tobacco, hay, and pasture.

Descriptions of the Soils

This section describes the soil series and mapping units in Estill and Lee Counties. Each soil series is described in considerable detail, and then, briefly, each mapping unit in that series. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless otherwise stated, the colors given in the descriptions are those of a moist soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Gullied land, for example, does not belong to a soil series. Nevertheless, it is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and woodland group in which the mapping unit has been placed. The page for the description of each capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The approximate acreage and proportionate extent of each mapping unit are shown in table 1. Many terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*17*).[1]

[1] Italic numbers in parentheses refer to Literature Cited, p. 85.

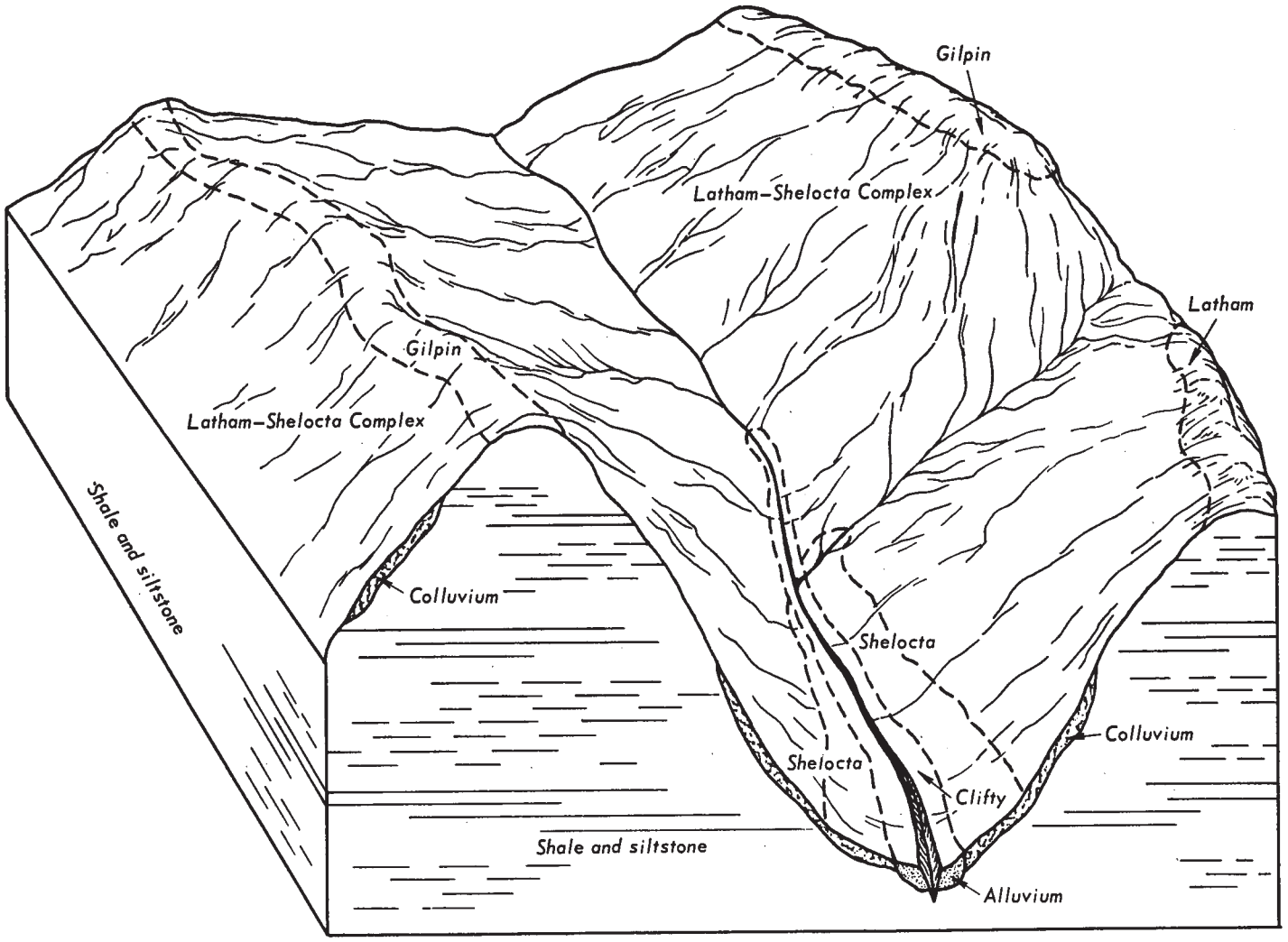

Figure 8.—**Pattern of soils and underlying material in the Latham-Shelocta-Gilpin association.**

Allegheny Series

The Allegheny series consists of deep, well-drained soils on stream terraces and in colluvial areas. In Estill and Lee Counties these soils are along present channels of the Kentucky River and its tributaries and on old, high terraces along former channels of the river. They are strongly acid. They formed in alluvium derived from siltstone, sandstone, and shale. Slopes range from 2 to 30 percent.

In a representative profile, the surface layer is dark grayish-brown loam about 7 inches thick. The subsoil extends to a depth of 34 inches. To a depth of 14 inches, it is yellowish-brown light clay loam. Below a depth of 14 inches, it is yellowish-brown clay loam that contains a few light brownish-gray mottles below a depth of 26 inches. The underlying material, reaching to a depth of 60 inches, is yellowish-brown clay loam or sandy clay loam mottled with light gray, light yellowish brown, pale brown, and dark brown.

Allegheny soils are easy to till. They have moderate natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Allegheny loam, 2 to 6 percent slopes; 600 yards south-southwest of U.S. Lock No. 11, in Estill County:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; many roots; slightly acid; clear, smooth boundary.

B1—7 to 14 inches, yellowish-brown (10YR 5/6) light clay loam; weak, fine and medium, subangular blocky structure; friable; few small roots; few dark-brown concretions; strongly acid; clear, smooth boundary.

B21t—14 to 26 inches, yellowish-brown (10YR 5/6) clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few thin clay films; few small roots; strongly acid; gradual, smooth boundary.

B22t—26 to 34 inches, yellowish-brown (10YR 5/8) clay loam; few, fine, distinct mottles of light brownish-gray (2.5YR 6/2); moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; few small roots; few small pores; many thin clay films; few thin lines and small pockets of sand; very strongly acid; gradual, smooth boundary.

C—34 to 60 inches, yellowish-brown (10YR 5/4 and 5/6) clay loam or sandy clay loam; common, medium, distinct

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Mapping unit	Acres	Percent	Mapping unit	Acres	Percent
Allegheny loam, 2 to 6 percent slopes	1,680	0.6	Hartsells fine sandy loam, 6 to 12 percent slopes	990	.3
Allegheny loam, 6 to 12 percent slopes	3,810	1.3	Huntington silt loam	4,220	1.4
Allegheny loam, 12 to 20 percent slopes	1,900	.6	Lanton silt loam, 0 to 2 percent slopes	960	.3
Allegheny loam, 20 to 30 percent slopes	340	.1	Latham silt loam, 6 to 12 percent slopes	4,150	1.4
Allegheny gravelly loam, 2 to 6 percent slopes	170	.1	Latham silt loam, 12 to 20 percent slopes	2,670	.9
Allegheny gravelly loam, 6 to 12 percent slopes	940	.3	Latham-Shelocta complex, 20 to 30 percent slopes	14,040	4.7
Alluvial land, steep	1,200	.4	Latham-Shelocta complex, 30 to 60 percent slopes	93,150	30.9
Bonnie silt loam	200	.1	Lindside silt loam	660	.2
Brookside stony silt loam, 30 to 60 percent slopes	27,910	9.3	Melvin silt loam	930	.3
Bruno loamy fine sand	1,090	.4	Monongahela fine sandy loam, 2 to 6 percent slopes	580	.2
Caneyville rocky silt loam, 6 to 20 percent slopes	710	.2	Morehead silt loam	2,130	.7
Caneyville very rocky silt loam, 20 to 30 percent slopes	3,190	1.0	Muse silt loam, 6 to 12 percent slopes	1,230	.4
Captina silt loam, 2 to 6 percent slopes	1,600	.5	Muse silt loam, 12 to 20 percent slopes	330	.1
Captina silt loam, 6 to 12 percent slopes	820	.3	Newark silt loam	2,960	1.0
Clifty gravelly silt loam	980	.3	Pope loam	1,380	.4
Colyer silt loam, 6 to 20 percent slopes	3,490	1.2	Purdy silt loam	240	.1
Colyer shaly silt loam, 20 to 50 percent slopes	21,350	7.1	Shelocta silt loam, 2 to 6 percent slopes	160	.1
Cruze silt loam, 2 to 6 percent slopes	450	.1	Shelocta silt loam, 6 to 12 percent slopes	2,540	.9
Cruze silt loam, 6 to 15 percent slopes	1,150	.4	Shelocta silt loam, 12 to 20 percent slopes	2,650	.9
Cuba silt loam	1,540	.5	Shelocta gravelly silt loam, 20 to 60 percent slopes	25,040	8.3
Dekalb-Ramsey-Rock outcrop complex, 6 to 12 percent slopes	470	.2	Shelocta and Jefferson stony soils, 20 to 60 percent slopes	25,850	8.6
Dekalb-Ramsey-Rock outcrop complex, 12 to to 20 percent slopes	1,340	.4	Shrouts silty clay loam, 12 to 30 percent slopes	3,420	1.1
Elk silt loam, 0 to 2 percent slopes	940	.3	Shrouts clay, 12 to 40 percent slopes, severely eroded	2,950	1.0
Elk silt loam, 2 to 6 percent slopes	570	.2	Stendal silt loam	950	.3
Elk silt loam, 6 to 12 percent slopes	100	.1	Stendal gravelly silt loam	690	.2
Fairmount extremely rocky silty clay loam, 12 to 30 percent slopes	2,360	.8	Trappist silt loam, 2 to 6 percent slopes	300	.1
Fairmount extremely rocky silty clay loam, 30 to 60 percent slopes	7,130	2.4	Trappist silt loam, 6 to 12 percent slopes	700	.2
Gilpin silt loam, 6 to 12 percent slopes	4,760	1.6	Whitley silt loam, 2 to 6 percent slopes	760	.3
Gilpin silt loam, 12 to 20 percent slopes	3,850	1.2	Whitley silt loam, 6 to 12 percent slopes	3,550	1.2
Gilpin silt loam, 12 to 20 percent slopes, severely eroded	230	.1	Whitley silt loam, 12 to 20 percent slopes	640	.2
Gilpin silt loam, 20 to 30 percent slopes	2,560	.8	Woolper silty clay loam, 6 to 12 percent slopes	1,060	.3
Gullied land	90	.1	Total	300,800	100.0

mottles of light gray, dark brown, pale brown, and light yellowish brown; massive; slightly plastic and slightly sticky; stratified beds of sand; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. The depth to bedrock is 5 to 10 feet or more. The A horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3 and 4/3) in some places. The B horizon ranges from yellowish brown (10YR 5/4 to 5/8) to strong brown (7.5YR 5/6) and is heavy clay loam in some places.

The Allegheny soils are near Jefferson, Monongahela, and Shelocta soils. They contain fewer coarse fragments than the Jefferson soils, and they lack the fragipan of the Monongahela soils. They are sandier and contain fewer coarse fragments than Shelocta soils.

Allegheny loam, 2 to 6 percent slopes (AgB).—This soil occupies stream terraces and ridgetops. Slopes are mostly convex, but in some colluvial areas at the base of mountainsides or hillsides, they are concave. This soil has the profile described as representative of the series.

Included with this soil in mapping were some areas where the surface layer is dark brown, areas where subsoil material has been mixed into the surface layer by plowing, and a few small areas that are nearly level.

This Allegheny soil is suited to all the field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is moderate in cultivated areas. Capability unit IIe-4; woodland group 1.

Allegheny loam, 6 to 12 percent slopes (AgC).—This soil occupies stream terraces and ridgetops. Slopes are mostly convex, but are concave in a few colluvial areas at the base of mountainsides or hillsides.

Included with this soil in mapping were areas where the surface layer is dark brown and areas where some subsoil material has been mixed into the surface layer by plowing.

This soil is suited to all the field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is severe in cultivated areas. Capability unit IIIe-5; woodland group 1.

Allegheny loam, 12 to 20 percent slopes (AgD).—This soil has convex and concave slopes and is on stream terraces, on upper slopes and ridgetops, and in colluvial areas.

Included with this soil in mapping were some areas where some subsoil material has been mixed into the

surface layer by plowing, a few small areas where the plow layer is mostly subsoil material, a few small areas of Shelocta soils, and areas of a gravelly Allegheny soil.

This Allegheny soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is very severe in cultivated areas. Capability unit IVe–1; woodland group 1.

Allegheny loam, 20 to 30 percent slopes (AgE).—This soil has convex and concave slopes and is on narrow stream terraces, on upper slopes, and in colluvial areas. It has a brown loam surface layer that has some material from the subsoil mixed into it by plowing.

Included with this soil in mapping were some areas where the plow layer is mostly subsoil material, areas where slopes are 12 to 20 percent, a few small areas of Shelocta soils, and areas of a gravelly Allegheny soil.

This Allegheny soil is suited to most hay crops and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is too severe for this soil to be used for crops. Capability unit VIe–1; woodland group 7.

Allegheny gravelly loam, 2 to 6 percent slopes (AhB).—This soil has concave slopes. It occupies narrow colluvial areas at the base of mountainsides. The surface layer and subsoil are 15 to 25 percent gravel.

Included with this soil in mapping were some areas where the surface layer has subsoil material mixed into it by plowing, and a few small areas where the gravel content is less than 15 percent.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. The high content of gravel makes tillage somewhat difficult. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is moderate in cultivated areas. Capability unit IIe–4; woodland group 1.

Allegheny gravelly loam, 6 to 12 percent slopes (AhC).—This soil has convex slopes and is on narrow colluvial areas at the base of mountainsides. The surface layer and subsoil are 15 to 25 percent gravel.

Included with this soil in mapping were some areas where the surface layer has subsoil material mixed into it by plowing, a few areas where the gravel content is less than 15 percent, and some areas where slopes are 12 to 20 percent.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. The high content of gravel makes tillage somewhat difficult. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is severe in cultivated areas. Capability unit IIIe–5; woodland group 1.

Alluvial Land, Steep

Alluvial land, steep (20 to 35 percent slopes) (AlF) is in long narrow strips on the banks of streams. In this survey area, it is mainly on banks of the Kentucky River but, to a minor extent, on banks of old meanders of former channels of the river. The surface layer is loamy fine sand or fine sandy loam. Beneath the surface layer are alternating layers of loam, silt loam, loamy fine sand, and fine sandy loam.

Included with this unit in mapping were some areas of soils that have a 4-inch overwash layer of loam, silt loam, or silty clay loam and a few small areas of Bruno, Huntington, and young loamy terrace soils.

This unit is suited to drought-resistant plants grown for hay and pasture. Most of the acreage is wooded, but some areas are used for field crops, hay crops, or pasture plants. Most areas are subject to frequent overflow. The available moisture capacity is low. Roots penetrate to a depth of 4 feet or more. The high content of sand makes these areas droughty. Natural fertility is moderate, and the organic-matter content is low. Tillage is easy. Crops respond fairly well to fertilizer. Most areas of this mapping unit in Estill County are only slightly acid, and no lime is needed. In Lee County most areas are strongly acid, and crops respond fairly well to lime. The erosion hazard is very severe in cultivated areas. Capability unit VIs–3; woodland group 8.

Bonnie Series

The Bonnie series consists of deep, poorly drained soils of the bottom land. These soils occur in Lee County along some tributaries of the Kentucky River. They are strongly acid. They formed in alluvium derived from acid shale, siltstone, and sandstone. Slopes are 0 to 2 percent.

In a representative profile, the surface layer is 6 inches thick and is dark grayish-brown silt loam mottled with yellowish brown and dark brown. The subsoil is 12 inches thick and is light brownish-gray silt loam mottled with yellowish brown. The substratum, extending to a depth of 48 inches, is light-gray silt loam mottled with strong brown and olive brown.

Bonnie soils have moderate natural fertility and low organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Bonnie silt loam; 200 feet south of Ky. Highway 708, one-half mile east of Canyon Falls, in Lee County:

Ap—0 to 6 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, faint mottles of yellowish brown (10YR 5/4) and dark brown (10YR 3/3); weak, medium, granular structure; very friable; strongly acid; clear, smooth boundary.

B2g—6 to 18 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, fine and medium, granular structure; very friable; very strongly acid; gradual, smooth boundary.

Cg—18 to 48 inches, light-gray (10YR 6/1) silt loam; many, medium, distinct mottles of strong brown (7.5YR 5/8) and olive brown (2.5Y 4/4); massive; friable; few small pockets of sandy material; very strongly acid.

The solum ranges from 15 to 30 inches in thickness. The depth to bedrock is 5 to 10 feet. The A horizon ranges from 3 to 8 inches in thickness and from dark grayish brown (2.5Y 4/2) to grayish brown (10YR 5/2) or light brownish gray (2.5Y 6/2). The B horizon is grayish brown (10YR 5/2) or light gray (10YR 6/1) in some areas. In places the C horizon is gray (10YR 5/1 or N 6/0). The B horizon ranges from silt loam to light silty clay loam. More than 60 percent of the matrix color of the B and C horizons has a chroma of 2 or less, and the mottles have a higher chroma.

Bonnie soils occur near Cuba, Stendal, and Shelocta soils. They are more poorly drained than Cuba and Stendal soils

and have a grayer subsoil than those soils. They contain fewer coarse fragments, have a grayer subsoil, and are more poorly drained than Shelocta soils.

Bonnie silt loam (0 to 2 percent slopes) (Bn).—This soil occupies low, flat areas or depressions of stream flood plains.

Included with this soil in mapping were some small areas of soils that have a 2- to 6-inch layer of fine sandy loam or loamy fine sand on the surface or in the subsoil.

This soil is suited only to plants that tolerate wetness. If adequately drained, it is suited to most crops commonly grown in the survey area. It is not suited to tobacco and alfalfa. This soil is subject to overflow, sometimes of rather long duration, and is poorly drained. The water table is within a depth of 6 inches during winter and spring. Tile drainage systems work well. Tilth is good where the soil is not wet. If adequate drainage is provided, crops respond well to lime and fertilizer. The depth to which roots can penetrate is limited by the seasonal high water table. Capability unit IIIw–1; woodland group 10.

Brookside Series

The Brookside series consists of deep, well-drained, stony soils of the uplands. These soils occur throughout the mountainous section of Estill County and along the western edge of Lee County. They are neutral in reaction. They formed mainly in colluvium from limestone bluffs, and in a few small areas in material derived from siltstone, sandstone, and shale. Slopes range from 30 to 60 percent.

In a representative profile, the surface layer is 5 inches thick and is dark-brown silt loam that is 20 percent limestone and sandstone fragments. The subsoil extends to a depth of 60 inches. The upper 7 inches is brown heavy silty clay loam that is 20 percent limestone and sandstone fragments. Between depths of 12 and 26 inches, it is brown clay that is 10 percent fragments. Between depths of 26 and 40 inches, the subsoil is dark yellowish-brown clay that is 10 percent fragments. Below a depth of 40 inches, it is dark yellowish-brown clay mottled with dark brown and strong brown and is 35 percent limestone and sandstone fragments.

Brookside soils have a high available moisture capacity and moderately slow permeability.

Representative profile of Brookside stony silt loam, 30 to 60 percent slopes; one-half mile east of Ky. Highway 52, along the Cobhill Road, in Estill County:

O1—½ inch to 0, partly decomposed leaf litter.

A1—0 to 5 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; very friable; many small roots; 20 percent coarse sandstone and limestone fragments; neutral; clear, smooth boundary.

B21t—5 to 12 inches, brown (7.5YR 4/4) heavy silty clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; common small roots; 20 percent small and large sandstone and limestone fragments; patchy thin clay films; neutral; gradual, smooth boundary.

B22t—12 to 26 inches, brown (7.5YR 4/4) clay; moderate, fine and medium, angular and subangular blocky structure; very firm, sticky and plastic; few small roots; 10 percent small and large sandstone and limestone fragments; patchy thin clay films; neutral; gradual, smooth boundary.

B23t—26 to 40 inches, dark yellowish-brown (10YR 4/4) clay; weak, fine and medium, subangular blocky structure; very firm, sticky and plastic; 10 percent small and large sandstone and limestone fragments; very patchy thin clay films; neutral; gradual, wavy boundary.

B3t—40 to 60 inches, dark yellowish-brown (10YR 4/4) clay; few, fine, faint, dark-brown (10YR 3/3) and strong-brown (7.5YR 5/6) mottles; weak, medium, blocky structure; very firm, sticky and plastic; very patchy clay films; 35 percent sandstone and limestone fragments; neutral.

The solum ranges from 60 to 84 inches in thickness. Depth to the underying acid, olive-gray or greenish-gray silty shale or siltstone ranges from 6 to 9 feet. The A horizon ranges from 2 to 6 inches in thickness and from dark brown (10YR 3/3) to very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), and dark brown (10YR 4/3). The B2 horizon is strong brown (7.5YR 5/6) and dark yellowish brown (10YR 4/4) in some places, and it ranges from heavy silty clay loam to clay. A mottled B3 horizon of mixed limestone and shale origin is present in some profiles. The reaction ranges from medium acid to neutral throughout. The solum is 5 to 35 percent coarse fragments.

Brookside soils are near Shelocta, Latham, and Caneyville soils. They have a darker surface layer than any of these soils and are more clayey than Shelocta soils. They contain more coarse fragments and are less acid than Latham soils, and they are deeper than Caneyville soils.

Brookside stony silt loam, 30 to 60 percent slopes (BoF).—This soil is on mountainsides at the base of nearly continuous limestone escarpments.

Included with this soil in mapping were adjacent limestone escarpments; some small colluvial areas of rock rubble; some narrow, benchlike areas where slopes are 10 to 20 percent, some of which have mottles in the subsoil below a depth of 20 inches; some steeper soils where the soil material is thinner; a soil similar to the Brookside soil, but underlain by shale or siltstone at a depth of 3 to 4 feet; and a few areas where the subsoil is reddish brown.

Most areas of this Brookside soil are wooded. A few small areas are used for pasture. This soil is too steep and too stony for cultivation, and pasture is difficult to maintain. The soil is well suited to most high-quality trees of the area. It has high natural fertility, but the steep slopes and stoniness make use of modern farm machinery nearly impossible. Roots can penetrate to a depth of 4 feet or more. Capability unit VIIs–1; woodland group 3 where slopes face south or west and group 7 where they face north or east.

Bruno Series

The Bruno series consists of deep, somewhat excessively drained, sandy soils of the bottom land, on banks and natural levees of the Kentucky River. These soils are slightly acid to very strongly acid. They formed in sandy alluvium. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is brown loamy fine sand 9 inches thick. The underlying material extends to a depth of 54 inches and consists of 6- to 14-inch layers of yellowish-brown, dark yellowish-brown, or brown fine sand, loam, or loamy fine sand.

Bruno soils are easy to till. They have low natural fertility and low organic-matter content. Permeability is rapid. The available moisture capacity is moderate to low.

Representative profile of Bruno loamy fine sand; 1

mile east of L&N Railroad underpass at Ravenna, on Ky. Highway 1571, in Estill County:

Ap—0 to 9 inches, brown (10YR 4/3) loamy fine sand; weak, fine, granular structure; very friable; common small roots; slightly acid; abrupt, wavy boundary.
C1—9 to 16 inches, yellowish-brown (10YR 5/4) fine sand; structureless (single grain); loose; few small roots; slightly acid; abrupt, wavy boundary.
C2—16 to 22 inches, dark yellowish-brown (10YR 3/4) loam; weak, fine and medium, granular structure; very friable; few small roots; slightly acid; abrupt, wavy boundary.
C3—22 to 30 inches, brown (10YR 4/3) loamy fine sand; weak, medium, granular structure; loose; slightly acid; gradual, smooth boundary.
C4—30 to 40 inches, yellowish-brown (10YR 5/6) fine sand; structureless (single grain); loose; slightly acid; gradual, smooth boundary.
C5—40 to 54 inches, dark yellowish-brown (10YR 4/4) loamy fine sand; few, fine, faint, brown (10YR 5/3) and grayish-brown (10YR 5/2) mottles; structureless (single grain); loose; slightly acid.

The depth to bedrock is 10 feet or more. The A horizon ranges from 4 to 12 inches in thickness, and from brown (10YR 4/3) to brown (10YR 5/3) and dark yellowish brown (10YR 4/4). The alternating underlying horizons are variable in texture and sequence. In places they are silt loam, fine sandy loam, and sand. The reaction ranges from slightly acid to very strongly acid.

The Bruno soils in Estill and Lee Counties have a soil temperature a few degrees lower than is defined in the range for the series. This difference does not affect the usefulness or behavior of these soils.

Bruno soils are near Huntington and Lindside soils. They are sandier than Huntington soils and have a lighter colored surface layer than those soils. They are sandier than Lindside soils and do not have the grayish subsoil colors of those soils.

Bruno loamy fine sand (0 to 4 percent slopes) (Bu).—This soil is in long narrow strips on natural levees and banks of the Kentucky River.

Included with this soil in mapping were some areas where this soil has about a 4-inch overwash layer of loam, silt loam, or silty clay loam, as well as areas of Bruno soils, on the banks of the Kentucky River, that have slopes as steep as 20 percent.

This Bruno soil is suited to drought-resistant field crops, hay crops, and pasture plants. Most areas are subject to frequent overflow. Crops respond fairly well to fertilizer. Most areas of this soil in Estill County are only slightly acid, and lime is not needed for most plants. Most areas of this soil in Lee County are strongly acid, and crops respond fairly well to lime. Roots can penetrate to a depth of 4 feet or more. The high content of sand makes this soil droughty. On the banks of the Kentucky River, where slopes are more than 6 percent, the erosion hazard is severe. Capability unit IIIs–1; woodland group 8.

Caneyville Series

The Caneyville series consists of moderately deep, well-drained, rocky soils of the uplands, in small scattered areas throughout the mountainous part of Estill County and along the western edge of Lee County. These soils are strongly acid. They formed in residuum derived from limestone. Slopes range from 6 to 30 percent.

In a representative profile, the surface layer is dark grayish-brown heavy silt loam 4 inches thick. The subsoil is 20 inches thick. The upper 3 inches is yellowish-brown silty clay. The next 10 inches is strong-brown clay. The lower 7 inches is mottled yellowish-red, light olive-brown, and yellowish-brown clay. The underlying material is light olive-brown clay mottled with yellowish brown and light brownish gray. Bedrock is at a depth of 32 inches.

Caneyville soils have low natural fertility and low organic-matter content. Permeability is slow. The available moisture capacity is moderate.

Representative profile of Caneyville rocky silt loam, 6 to 20 percent slopes; 50 yards north of Edwards Branch, at a point about three-fourths of a mile from the confluence of Edwards Branch and Middle Fork just east of Wilson Mountain, in Estill County:

O1—½ to ¼ inch, leaf litter.
O2—¼ inch to 0, decomposed leaf litter.
A1—0 to 4 inches, dark grayish-brown (10YR 4/2) heavy silt loam; common, fine, faint mottles of brown (10YR 5/3); moderate, medium, granular structure; friable; many small roots; strongly acid; clear, smooth boundary.
B1t—4 to 7 inches, yellowish-brown (10YR 5/6) silty clay; moderate, medium, blocky structure; firm; few clay films; many small roots; strongly acid; gradual, smooth boundary.
B2t—7 to 17 inches, strong-brown (7.5YR 5/6) clay; moderate, medium, blocky structure; very firm, sticky and plastic; common clay films; common small roots, and few root channels filled with dark grayish-brown soil material; strongly acid; gradual, smooth boundary.
B3—17 to 24 inches, mottled yellowish-red (5YR 5/8), light olive-brown (2.5Y 5/4), and yellowish-brown (10YR 5/6) clay; weak, medium, blocky structure; extremely firm, very sticky and plastic; few small roots; medium acid; gradual, smooth boundary.
C—24 to 32 inches, light olive-brown (2.5Y 5/4) clay; many, medium, distinct mottles of yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2); massive; extremely firm, very sticky and plastic; few small roots; many, small, light-gray and yellowish, calcareous limestone fragments; mildly alkaline; clear, wavy boundary.
R—32 inches, hard limestone rock.

Depth to bedrock ranges from 20 to 40 inches, and the solum ranges from 2 to 3 feet in thickness. The A1 horizon ranges from 2 to 6 inches in thickness. The A1 horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) and brown (10YR 4/3). The B1 horizon is absent in some profiles. The B2 horizon ranges from strong brown (7.5YR 5/6) to yellowish red (5YR 5/6) and yellowish brown (10YR 5/6). The B3 horizon extends to bedrock in some places, and in many places it has a dominant brownish or grayish color and is mottled. In some areas the C horizon has a dominant grayish color.

Caneyville soils are near Brookside, Shelocta, and Latham soils. They are shallower than Brookside soils and have a lighter colored surface layer than those soils. They are shallower than Shelocta soils and have a more clayey subsoil than those soils. They are shallower than Latham soils and are underlain by limestone, whereas Latham soils are underlain by soft clay shale.

Caneyville rocky silt loam, 6 to 20 percent slopes (CaD).—This soil has convex and concave slopes and occurs at the extreme ends of some mountain ridgetops, at a slightly lower elevation than the main ridges and just above the limestone escarpments. It has the profile described as representative of the series. Most areas contain a few sinkholes. From 5 to 15 percent of the acreage is limestone outcrops.

Included with this soil in mapping were some areas of a soil near rock outcrops that has a profile similar to that of Fairmount soils and areas of a soil that has 6 to 12

inches of loamy colluvial material over a subsoil that resembles that of Caneyville soils.

Most of the acreage of this Caneyville soil is wooded, but some areas are used for pasture. This soil is suited to most of the hay and pasture plants commonly grown in the survey area. Some small areas where slopes range from 6 to 12 percent can be used in some years for cultivated crops. Crops respond fairly well to lime and fertilizer. Rock outcrops and the high content of clay below a depth of 4 inches make tillage difficult. Roots can penetrate to a depth of about 24 inches. Most of the acreage is too rocky for cultivation. Capability unit VIs–1; woodland group 3.

Caneyville very rocky silt loam, 20 to 30 percent slopes (CeE).—This soil has convex and concave slopes and is at the extreme ends of some mountain ridgetops, at a slightly lower elevation than the main ridges and just above some limestone escarpments. Most areas contain a few sinkholes. From 15 to 25 percent of the acreage is limestone outcrops.

Included with this soil in mapping were some areas of Fairmount soils and areas of a soil that has 6 to 12 inches of loamy colluvial material over a subsoil that resembles that of Caneyville soils.

Most of the acreage of this Caneyville soil is wooded, but a few areas are used for pasture. This soil is suited to trees and to most pasture plants commonly grown in the survey area. Maintaining pasture, however, is difficult. Crops respond fairly well to lime and fertilizer. The numerous rock outcrops make tillage very difficult. Roots can penetrate to a depth of about 24 inches. This soil is too steep and too rocky for cultivation. Capability unit VIIs–1; woodland group 3.

Captina Series

The Captina series consists of moderately well drained soils that contain a fragipan. These soils occur mostly in Estill County on stream terraces along the Kentucky River and its larger tributaries. They are strongly acid. They formed in alluvium or colluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 2 to 12 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam 7 inches thick. The subsoil is yellowish-brown or brownish-yellow silt loam or heavy silt loam to a depth of 22 inches. The lower part is a firm, compact fragipan that extends to a depth of about 42 inches. The upper part of the fragipan is light yellowish-brown light silty clay loam mottled with light brownish gray and yellowish brown. The lower part is light-gray light silty clay loam mottled with yellowish brown. The underlying material extends to a depth of 54 inches and is mottled light brownish-gray, yellowish-brown, and strong-brown heavy silt loam.

Captina soils have moderate natural fertility and moderate available moisture capacity. The water table is at a depth of 1½ to 2 feet during winter and spring. Permeability is slow in the fragipan.

Representative profile of Captina silt loam, 2 to 6 percent slopes; 200 yards east of Cow Creek bridge, on Ky. Highway 52, in Estill County:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; few fine roots; friable; strongly acid; clear, smooth boundary.

B1—7 to 12 inches, yellowish-brown (10YR 5/6) silt loam; few dark-brown concretions; weak, fine, subangular blocky structure; friable; few fine roots; strongly acid; clear, smooth boundary.

B2t—12 to 22 inches, brownish-yellow (10YR 6/6) heavy silt loam; few, fine, faint mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable; few clay films; strongly acid; gradual, smooth boundary.

Bx1—22 to 30 inches, light yellowish-brown (10YR 6/4) light silty clay loam; common, medium, faint mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8); moderate, coarse, prismatic structure parting to weak, thick, platy; firm and brittle; common clay films; very strongly acid; gradual, smooth boundary.

Bx2—30 to 42 inches, light-gray (10YR 7/2) light silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; firm, compact and brittle; common clay films and silt coatings; very strongly acid; gradual, wavy boundary.

C—42 to 54 inches, mottled light brownish-gray (10YR 6/2), yellowish-brown (10YR 5/8), and strong-brown (7.5YR 5/6) heavy silt loam; massive; firm; very strongly acid.

The solum ranges from 3 to 5 feet in thickness. Depth to bedrock ranges from 5 to 10 feet or more. The A horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) and brown (10YR 5/3). The B1 and B2 horizons are yellowish-brown (10YR 5/4 or 5/6), brownish yellow (10YR 6/6), or light yellowish-brown (10YR 6/4) silt loam to light silty clay loam. Depth to the fragipan (Bx1 horizon) ranges from 18 to 26 inches.

Captina soils are near Allegheny and Morehead soils. They are not so well drained as Allegheny soils, which do not have a fragipan. They are better drained and less grayish than Morehead soils.

Captina silt loam, 2 to 6 percent slopes (CmB).—This soil has convex or concave slopes and is on fairly wide, long stream terraces at slightly higher elevations than stream flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were some nearly level soils, some areas where some subsoil material has been mixed into the surface layer by plowing and has made it brown or dark yellowish brown and some areas of a soil similar to Captina soils but less acid.

This Captina soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Alfalfa can be damaged by excess water in the root zone, mostly late in winter and early in spring. This soil is easily tilled. Organic-matter content is medium. Crops respond well to lime and fertilizer. Roots can penetrate as far down as the fragipan, which is at a depth of about 22 inches. The erosion hazard is moderate in cultivated areas. Capability unit IIe–3; woodland group 4.

Captina silt loam, 6 to 12 percent slopes (CmC).—This soil has concave slopes and is on long narrow stream terraces mostly at the base of hills.

Included with this soil in mapping were some areas that are severely eroded and have a plow layer that is mostly brown or dark yellowish-brown subsoil material and some areas of a soil that is similar to Captina soils but less acid.

This Captina soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Alfalfa can be damaged by excess water in the root zone, mostly late in winter and early in spring. This soil is easily tilled. Organic-matter content is medium to

low. Crops respond well to lime and fertilizer. Roots can penetrate as far down as the fragipan, which is at a depth of about 20 inches. The erosion hazard is severe in cultivated areas. Capability unit IIIe–4; woodland group 4.

Clifty Series

The Clifty series consists of deep, well-drained, gravelly soils of the bottom lands, on long narrow flood plains of small streams in Lee County. These soils are medium acid to strongly acid. They formed in alluvium derived from acid siltstone, sandstone, and shale. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is brown gravelly silt loam 7 inches thick. The subsoil is dark yellowish-brown gravelly loam. It is underlain at a depth of 24 inches by dark yellowish-brown very gravelly fine sandy loam that extends to a depth of 48 inches.

Clifty soils have moderate available moisture capacity and moderately rapid permeability.

Representative profile of Clifty gravelly silt loam; 3 miles southeast of Beattyville along Pawpaw Creek, in Lee County:

Ap—0 to 7 inches, brown (10YR 4/3) gravelly silt loam; moderate, medium, granular structure; very friable; 15 percent small and large pebbles; many small roots; medium acid; clear, smooth boundary.

B—7 to 24 inches, dark yellowish-brown (10YR 4/4) gravelly loam; weak, fine and medium, granular structure; very friable; 20 percent small and large pebbles; contains a layer 2 inches thick that is 60 percent pebbles; common small roots; strongly acid; gradual, smooth boundary.

C—24 to 48 inches, dark yellowish-brown (10YR 4/4) very gravelly fine sandy loam; single grain; very friable; 45 percent small and large pebbles; few small roots; very strongly acid.

The depth to hard rock ranges from 4 to 8 feet. The solum ranges from 20 to 40 inches in thickness. The A horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) and is 10 to 25 percent gravel. The B horizon ranges from dark yellowish brown (10YR 4/4) to brown (10YR 5/3) and yellowish brown (10YR 5/4) and is 15 to 25 percent gravel. The C horizon in places has thin layers and small pockets of loam and a lower percentage of gravel.

Clifty soils are near Cuba, Pope, and Stendal soils. They are more gravelly than Cuba and Pope soils and are more sandy in the lower horizons than Cuba soils. They are better drained than Stendal soils, and they do not have the grayish colors that are typical of those soils.

Clifty gravelly silt loam (0 to 4 percent slopes) (Cn).—This soil is on long narrow flood plains of small streams.

Included with this soil in mapping were a few small areas where the surface layer is gravelly loam or fine sandy loam and a few small nongravelly areas.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is occasionally subject to overflow of short duration. The content of gravel makes tillage somewhat difficult. Natural fertility is moderate. Organic-matter content is medium. Crops respond well to lime and fertilizer. The large volume of gravel results in low available moisture capacity and low plant nutrients, which restrict root penetration below a depth of 24 inches. The erosion hazard is none to slight. Capability unit IIs–1; woodland group 8.

Colyer Series

The Colyer series consists of somewhat excessively drained soils that are shallow over shale. These soils are on uplands in the northwestern and west-central parts of Estill County. They are very strongly acid. They formed in residuum derived from black shale. Slopes range from 6 to 50 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam 2 inches thick. The upper 10 inches of the subsoil is strong-brown shaly silty clay. The lower 3 inches is mottled strong-brown and yellowish-red shaly clay that is about 50 percent black shale fragments. It is underlain by bedrock at a depth of about 15 inches.

Colyer soils have low natural fertility. Permeability is moderately slow. The available moisture capacity is low.

Representative profile of Colyer silt loam, 6 to 20 percent slopes; 1½ miles south of Hargett, on the gravel road west of Ky. Highway 89, in Estill County:

O1—½ inch to 0, decomposed leaf litter.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine and medium, granular structure; very friable; many small roots; 5 percent small black shale fragments; very strongly acid; clear, smooth boundary.

B2—2 to 12 inches, strong-brown (7.5YR 5/6) shaly silty clay; weak, fine and medium, blocky structure; firm; common small roots; 35 percent small black shale fragments; very strongly acid; gradual, smooth boundary.

B3—12 to 15 inches, mottled strong-brown (7.5YR 5/6) and yellowish-red (5YR 4/6) shaly clay; massive; very firm, sticky and plastic; few small roots; 50 percent black shale fragments; extremely acid.

R—15 inches, hard black shale.

The solum is 8 to 20 inches thick over bedrock. The A horizon ranges from 1 to 6 inches in thickness and from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) and brown (10YR 5/3). The B2 horizon ranges from strong brown (7.5YR 5/6) to yellowish red (5YR 4/6). In some profiles the B3 horizon is replaced by a C horizon that contains some grayish mottles and shale fragments. The B2 and B3 horizons range from heavy silty clay loam to clay and from 35 to 50 percent coarse fragments.

Colyer soils are near Trappist and Muse soils. They are shallower than those soils and have a much higher percentage of shale fragments.

Colyer silt loam, 6 to 20 percent slopes (CoD).—This soil has convex slopes and is on narrow ridgetops and upper slopes. It has the profile described as representative of the series.

Included with this soil in mapping were some small areas of Trappist soils; areas of a soil that is similar to Colyer soils, but is less than 35 percent shale fragments; a few small areas of a severely eroded Colyer soil; some shale outcrops; and some areas where slopes are 3 to 6 percent.

This Colyer soil is suited to drought-resistant hay crops and pasture plants and to trees. Most areas are used for pasture, most of which is low quality. Some fairly large areas either are wooded or are reverting to woods. The high clay content below the 2-inch surface layer makes this soil somewhat difficult to till. Crop response to lime and fertilizer is fair to poor. The organic-matter content is low. Roots can penetrate to a depth of about 12 inches. This soil is droughty and too shallow and the erosion

hazard is too severe for cultivation. Capability unit VIs–2; woodland group 5.

Colyer shaly silt loam, 20 to 50 percent slopes (CrF).—This soil is on hillsides. Slopes are mostly convex. Some lower slopes are concave.

Included with this soil in mapping were some small areas of Trappist soils; areas of a soil similar to Colyer soils, but less than 35 percent shale fragments; some areas of a severely eroded Colyer soil; some small areas of shale outcrops; and areas where slopes are less than 20 percent.

This Colyer soil is suited to trees or to limited grazing of drought-resistant pasture plants. Most areas are wooded or are reverting to woods. Some rather large areas are used for pasture, most of which is low quality. The high clay content below the 2-inch surface layer makes this soil somewhat difficult to till. Crop response to lime and fertilizer is poor to fair. The organic-matter content is low. Roots can penetrate to a depth of about 12 inches. This soil is droughty and is too shallow and too steep for cultivation. Capability unit VIIs–2; woodland group 5 where slopes face north or east and group 6 where they face south or west.

Cruze Series

The Cruze series consists of deep, well drained or moderately well drained soils in the west-central and northwestern parts of Estill County. These soils are strongly acid. They formed in colluvium derived from acid shale. Slopes range from 2 to 15 percent.

In a representative profile, the surface layer is brown silt loam 7 inches thick. The subsoil extends to a depth of about 34 inches. To a depth of about 12 inches, it is dark yellowish-brown heavy silt loam. Below this and extending to a depth of about 34 inches, it is yellowish-brown heavy silty clay loam that contains a few mottles of pale brown, dark brown, and gray below a depth of 20 inches. The underlying material to a depth of 46 inches is brown silty clay that contains many mottles of strong brown, yellowish brown, light olive gray, and dark brown and has common shale or siltstone fragments.

Cruze soils have moderate natural fertility and medium organic-matter content. Permeability is moderately slow. The available moisture capacity is high. The water table is at a depth of 2½ to 3 feet during winter and spring.

Representative profile of Cruze silt loam, 6 to 15 percent slopes; one-fourth mile south of the Powell County line on Ky. Highway 82, in Estill County:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many roots; few small shale fragments; strongly acid; gradual, smooth boundary.

B1—7 to 12 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; weak, fine, subangular blocky structure; friable; few roots; common, small, black concretions; strongly acid; gradual, smooth boundary.

B2t—12 to 20 inches, yellowish-brown (10YR 5/6) heavy silty clay loam; few, fine, faint mottles of pale brown (10YR 6/3) in lower part; moderate, medium, subangular blocky structure; firm, sticky and plastic; many, small, black concretions; few small shale fragments; few thin clay films; very strongly acid; clear, smooth boundary.

B3t—20 to 34 inches, yellowish-brown (10YR 5/6) heavy silty clay loam; few, fine, faint mottles of pale brown (10YR 6/3), dark brown (7.5YR 4/4), and gray (10YR 6/1); moderate, medium, angular and subangular blocky structure; firm, sticky and plastic; many black concretions; few small shale fragments; strongly acid; gradual, smooth boundary.

C—34 to 46 inches, brown (10YR 5/3) silty clay; many, coarse, distinct mottles of strong brown, yellowish brown, light olive gray, and dark brown; massive; very firm, sticky and plastic; many black concretions; common shale and siltstone fragments; strongly acid.

The solum ranges from 30 to 50 inches in thickness. The depth to bedrock is 4 to 8 feet. The A horizon ranges from brown (10YR 4/3) to brown (10YR 5/3) and dark grayish brown (10YR 4/2). The B2t and B3t horizons range from yellowish brown (10YR 5/6) to dark yellowish brown (10YR 4/4) and olive brown (2.5Y 4/4), and in some profiles they are silty clay. In some profiles the C horizon is evenly mottled without a dominant color or in dominant colors of dark grayish brown (10YR 4/2) and grayish brown (2.5Y 5/2). In some profiles the C horizon is heavy silty clay loam.

Cruze soils are near Muse, Captina, and Colyer soils. They are less well drained than Muse soils and are yellower than these soils. They are better drained than Captina soils and do not have the fragipan that is typical of those soils. They are deeper and yellower than Colyer soils, and they do not have the high percentage of shale fragments typical of those soils.

Cruze silt loam, 2 to 6 percent slopes (CsB).—This soil has concave or convex slopes and is on long, fairly wide or narrow, colluvial areas at the base of some hills.

Included with this soil in mapping were a few small areas of nearly level soils.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Such crops as alfalfa can be slightly damaged by excess water in the root zone late in winter or early in spring. This soil is easily tilled, and crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 34 inches. The erosion hazard is moderate in cultivated areas. Capability unit IIe–2; woodland group 4.

Cruze silt loam, 6 to 15 percent slopes (CsC).—This soil has mostly concave slopes and is on long, narrow, colluvial areas at the base of some hills. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where the surface layer has been mixed with subsoil material.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is easily tilled, and crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 34 inches. The erosion hazard is severe in cultivated areas. Capability unit IIIe–3; woodland group 4.

Cuba Series

The Cuba series consists of deep, well-drained soils of the bottom land along the Kentucky River and its tributaries in Lee County. These soils are strongly acid. They formed in alluvium derived from soils of acid shale, siltstone, and sandstone. Slopes range from 0 to 6 percent.

In a representative profile, the surface layer is dark-brown silt loam 6 inches thick. The subsoil extends to a depth of 48 inches. To a depth of 20 inches, it is brown silt loam. Below a depth of 20 inches, it is dark yellowish-brown silt loam.

Cuba soils are easy to till. They have moderate natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capability is high.

Representative profile of Cuba silt loam; 1¼ miles south of Beattyville on the South Fork of Kentucky River, on Ky. Highway 1411, in Lee County:

Ap—0 to 6 inches, dark-brown (10YR 3/3) silt loam; moderate, fine and medium, granular structure; very friable; many small roots; strongly acid; gradual, smooth boundary.

B21—6 to 20 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure; very friable; common small roots; strongly acid; gradual, smooth boundary.

B22—20 to 48 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine and medium, granular structure; friable; few small roots; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is 5 to 10 feet or more. In some profiles the A horizon is very dark grayish brown (10YR 3/2). The B21 horizon is brown (10YR 4/3) or dark yellowish brown (10YR 4/4). The B22 horizon ranges from dark yellowish brown (10YR 4/4) to dark grayish brown (10YR 4/2).

Cuba soils in Estill and Lee Counties have a surface layer that is darker than is defined in the range for the series. This difference does not affect the usefulness or behavior of these soils.

Cuba soils are near Stendal, Pope, and Bruno soils. They are less sandy than Bruno and Pope soils and not so gray as Stendal soils.

Cuba silt loam (0 to 6 percent slopes) (Cu).—This soil is on stream flood plains.

Included with this soil in mapping were some areas where the subsoil contains thin layers of fine sandy loam and a few areas where slopes are 6 to 20 percent.

This soil is well suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Most areas are subject to overflow, mostly late in winter and early in spring. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is none to slight. Capability unit I–1; woodland group 8.

Dekalb Series

The Dekalb series consists of moderately deep, well-drained soils of the uplands, mostly in the northwestern part of Lee County. These soils are very strongly acid. They formed in residuum derived from acid sandstone. Slopes range from 6 to 20 percent.

In a representative profile, the surface layer is 8 inches thick. The upper half is dark grayish-brown fine sandy loam that is 5 percent sandstone fragments. The lower half is brown fine sandy loam that is 25 percent sandstone fragments. The subsoil extends to a depth of 30 inches. To a depth of 22 inches, it is yellowish-brown fine sandy loam that is 25 percent sandstone fragments. Below a depth of 22 inches, it is yellowish-brown fine sandy loam that is 50 percent sandstone fragments and has a few mottles of strong brown. Sandstone bedrock is at a depth of 30 inches.

Dekalb soils have low natural fertility and low organic-matter content. Permeability is moderately rapid. The available moisture capacity is moderate.

Representative profile of Dekalb fine sandy loam in an area of Dekalb-Ramsey-Rock outcrop complex, 12 to 20 percent slopes; one-fourth mile north of Ky. Highway 1746, 2 miles north of Ky. Highway 52, in Lee County:

O1—½ inch to 0, partly decomposed leaf litter, mostly pine needles.

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine and medium, granular structure; very friable; many small roots; 5 percent sandstone fragments; very strongly acid; clear, smooth boundary.

A2—4 to 8 inches, brown (10YR 5/3) fine sandy loam; weak, medium, granular structure; very friable; many small roots; 25 percent sandstone fragments; very strongly acid; clear, smooth boundary.

B2—8 to 22 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, subangular blocky structure; very friable; common small roots; 25 percent sandstone fragments; very strongly acid; gradual, wavy boundary.

B3—22 to 30 inches, yellowish-brown (10YR 5/6) fine sandy loam; few, fine, faint mottles of strong brown (7.5YR 5/8); weak, medium, subangular blocky structure; very friable; few small roots; 50 percent sandstone fragments; very strongly acid.

R—30 inches, sandstone bedrock.

The solum is 20 to 40 inches thick over bedrock. The A1 horizon ranges from 2 to 6 inches in thickness and from dark grayish brown (10YR 4/2) to brown (10YR 4/3) and grayish brown (10YR 5/2). The A2 horizon is absent in some profiles. The B horizon ranges from yellowish brown (10YR 5/4) to strong brown (7.5YR 5/6).

Dekalb soils are associated with Hartsells and Gilpin soils. They are sandier in the subsoil than Hartsells soils and are sandier throughout than Gilpin soils.

Dekalb-Ramsey-Rock outcrop complex, 6 to 12 percent slopes (DrC).—This mapping unit is about 50 percent Dekalb fine sandy loam, 35 percent Ramsey fine sandy loam, and 15 percent Rock outcrop. It is on long, narrow mountain ridgetops. Slopes are convex. Sandstone crops out along the extreme outer edges and ends of the ridgetops and adjacent escarpments. Included in mapping were small areas of Hartsells and Gilpin soils.

Sandstone fragments in the surface layer make these soils somewhat difficult to till. Droughtiness is a limitation. Roots can penetrate to a depth of about 15 to 30 inches, and the available moisture capacity is moderate to very low. The response of plants to lime and fertilizer is fair to poor. The erosion hazard is severe in cultivated areas. The Rock outcrop part of this unit supports very little plant growth other than low bushes and stunted trees.

Most of the acreage is wooded. Areas are mostly small and inaccessible. Dekalb and Ramsey soils are suited to drought-resistant plants grown for hay and pasture, and the Dekalb soil is suited to some row crops. Capability unit VIs–1; woodland group 2.

DeKalb-Ramsey-Rock outcrop complex, 12 to 20 percent slopes (DrD).—This mapping unit is about 50 percent Dekalb fine sandy loam, 35 percent Ramsey fine sandy loam, and 15 percent Rock outcrop. It is on mountain ridgetops. Slopes are complex. Sandstone crops out along the extreme edges and ends of the ridgetops and adjoining escarpments. The soils in this complex have the profile described as representative of the Dekalb and Ramsey series. Included in mapping were small areas of Hartsells and Gilpin soils.

Sandstone fragments in the surface layer make these soils somewhat difficult to till. Droughtiness is a limitation. Roots can penetrate to a depth of about 15 to 30 inches, and the available moisture capacity is moderate to very low. The response of plants to lime and fertilizer is fair to poor. The erosion hazard is very severe in cultivated areas. The Rock outcrop part of this unit supports very little plant growth other than low bushes and stunted trees.

Most of the acreage is wooded. Areas are mostly small and inaccessible. Dekalb and Ramsey soils are suited to drought-resistant hay and pasture plants, and the Dekalb soil is suited to some row crops. Capability unit VIs–1; woodland group 2.

Elk Series

The Elk series consists of deep, well-drained soils on stream terraces along the Kentucky River and its larger tributaries. These soils are strongly acid. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 0 to 12 percent.

In a representative profile, the surface layer is brown silt loam 8 inches thick. The subsoil extends to a depth of 47 inches. To a depth of 36 inches, it is brown light silty clay loam. Below a depth of 36 inches, it is dark yellowish-brown light silty clay loam that contains a few mottles of very pale brown.

Elk soils have moderate natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Elk silt loam, 0 to 2 percent slopes; along the lower river road, 1¼ miles southeast of Irvine, in Estill County:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.

B1—8 to 20 inches, brown (7.5YR 4/4) light silty clay loam; weak, fine and medium, subangular blocky structure; friable; few roots; few thin clay films; very strongly acid; gradual, smooth boundary.

B2t—20 to 36 inches, brown (7.5YR 4/4) light silty clay loam; moderate, medium, subangular blocky structure; friable to firm; few clay films; very strongly acid; gradual, smooth boundary.

B3—36 to 47 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; few, fine, faint mottles of very pale brown (10YR 7/3); weak, medium, angular and subangular blocky structure; firm; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is 5 to 10 feet or more. In some profiles the A horizon is dark yellowish brown (10YR 4/4). In some the B1 horizon is dark yellowish-brown (10YR 4/4) heavy silt loam. The B2t and B3 horizons range from brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4). Reaction throughout the profile ranges from medium acid to very strongly acid.

Elk soils are near Allegheny and Captina soils. They contain less sand than Allegheny soils. They are browner and better drained than Captina soils and do not have the fragipan that is typical of those soils.

Elk silt loam, 0 to 2 percent slopes (ElA).—This soil is on wide stream terraces slightly higher in elevation than flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were a few small areas of gently sloping soils and a few small pockets where wetness is a slight problem.

This soil is well suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Some lower lying areas are occasionally subject to overflow of short duration late in winter or early in spring. This soil is easily tilled, and crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is none to slight. Capability unit I–3; woodland group 1.

Elk silt loam, 2 to 6 percent slopes (ElB).—This soil has convex slopes and is on wide stream terraces slightly higher in elevation than stream flood plains.

Included with this soil in mapping were a few small areas where slopes are 6 to 9 percent, a few areas of nearly level soils, and some areas where the plow layer has subsoil material mixed into it.

This soil is well suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Some lower lying areas are occasionally subject to overflow of short duration late in winter or early in spring. This soil is easily tilled, and crops respond well to lime and fertilizer. Roots can penetrate to a depth or 4 feet or more. The erosion hazard is moderate in cultivated areas. Capability unit IIe–1; woodland group 1.

Elk silt loam, 6 to 12 percent slopes (ElC).—This soil has convex or concave slopes and is on wide stream terraces slightly higher in elevation than stream flood plains.

Included with this soil in mapping were some areas where the plow layer is mixed with material from the subsoil and other areas where the plow layer is mostly subsoil material.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Some lower lying areas are occasionally subject to overflow of short duration late in winter or early in spring. This soil is easily tilled, and crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 4 feet. The erosion hazard is severe in cultivated areas. Capability unit IIIe–1; woodland group 1.

Fairmount Series

The Fairmount series consists of shallow, well-drained soils of the uplands in a long, narrow, hilly area near the Kentucky River along the northwestern edge of Estill County. These soils are neutral in reaction. They formed in residuum derived from limestone. Slopes range from 12 to 60 percent.

In a representative profile, the surface layer is dark-brown flaggy silty clay loam 9 inches thick. The subsoil extends to a depth of about 16 inches. To a depth of 13 inches, it is brown flaggy silty clay. Below a depth of 13 inches, it is light olive-brown to olive-brown flaggy clay. Bedrock is at a depth of about 16 inches.

Fairmount soils have high natural fertility. The high clay content of the surface layer and the numerous small stones and rock outcrops make these soils difficult to till. Permeability is moderately slow. The available moisture capacity is low.

Representative profile of Fairmount extremely rocky silty clay loam, 12 to 30 percent slopes; one-half mile southeast of lock number 11, 200 yards south of the Fox Road, in Estill County:

Ap—0 to 9 inches, dark-brown (10YR 3/3) flaggy silty clay loam; strong, fine, granular structure; friable; many fine roots; neutral; gradual, smooth boundary.

B21—9 to 13 inches, brown (10YR 4/3) silty clay; moderate, fine, angular blocky structure; firm, sticky and plastic; few limestone flags; few fine roots; neutral; clear, diffuse boundary.

B22—13 to 16 inches, light olive-brown (2.5Y 5/4) to olive-brown (2.5Y 4/4) clay; moderate, fine, angular blocky structure; firm, sticky and plastic; few small roots; few specks of reddish-yellow siltstone and carbonate; common thin limestone slabs; neutral.

R—16 inches, hard fractured limestone.

The solum is 10 to 20 inches thick over bedrock. The A horizon ranges from dark brown (10YR 3/3) to very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) and from 5 to 10 inches in thickness.

Fairmount soils are near Shrouts and Allegheny soils. They are shallower than Shrouts soils, which are underlain by calcareous clay shale. They have a darker surface layer than Allegheny soils, and they are shallower and more clayey than those soils.

Fairmount extremely rocky silty clay loam, 12 to 30 percent slopes (FeE).—This soil is on middle and upper slopes of deep valleys. It is 25 to 40 percent rock outcrop. It has the profile described as representative of the series. In small areas on the ridge crests between valleys, the slopes are convex.

Included with this soil in mapping were some areas of a Shrouts soil.

This Fairmount soil is droughty and is suited only to drought-resistant pasture plants or trees. The use of modern farm machinery is hazardous in some areas, which makes maintenance of pasture difficult. Roots can penetrate to a depth of about 16 inches. The response to fertilizer is poor. No lime is needed. This soil is too shallow, too rocky, and in most places, too steep for cultivation. Capability unit VIIs–1; woodland group 5.

Fairmount extremely rocky silty clay loam, 30 to 60 percent slopes (FeF).—This soil is on middle and lower slopes of deep valleys. It is 25 to 50 percent limestone rock outcrop.

Included with this soil in mapping were some areas of a Shrouts soil.

This Fairmount soil is droughty and is suited only to drought-resistant pasture plants. The use of modern farm machinery is hazardous, and maintenance of pasture is difficult or nearly impossible. Roots can penetrate to a depth of about 16 inches. The response to fertilizer is poor. No lime is needed. This soil is too steep, too shallow, and too rocky for cultivation. Most of the acreage is wooded. Capability unit VIIs–1; woodland group 5.

Gilpin Series

The Gilpin series consists of moderately deep, well-drained soils of the uplands in the mountainous part of Estill County and throughout Lee County. These soils are strongly acid. They formed in residuum derived from acid siltstone and shale and some interbedded sandstone. Slopes range from 6 to 30 percent.

In a representative profile, the surface layer is grayish-brown silt loam 6 inches thick. The subsoil extends to a depth of 28 inches. The upper 13 inches is yellowish-brown silt loam or light silty clay loam. The middle part is strong-brown light silty clay loam that is 5 to 15 percent sandstone and shale fragments. Below a depth of 23 inches is brown silty clay loam, mottled with yellowish brown, gray, and strong brown, that is 15 to 30 percent sandstone and shale fragments. Bedrock is at a depth of 28 inches.

Gilpin soils have low natural fertility. Permeability is moderate. The available moisture capacity is moderate.

Representative profile of Gilpin silt loam, 6 to 12 percent slopes; 1 mile north of Ky. Highway 498, 1¼ miles east of Ky. Highway 11, in Lee County:

O2—½ inch to 0, leaves and partly decomposed material.
A1—0 to 6 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.
B1—6 to 9 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; few roots; strongly acid; clear, smooth boundary.
B21t—9 to 13 inches, yellowish-brown (10YR 5/6 to 5/8) light silty clay loam; moderate, fine, subangular blocky structure; friable; slightly sticky and plastic; common thin clay films; few sandstone and shale fragments; very strongly acid; gradual, smooth boundary.
B22t—13 to 23 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; friable; slightly sticky and plastic; 5 to 15 percent sandstone and shale fragments by volume; many clay films; very strongly acid; gradual, smooth boundary.
B3—23 to 28 inches, brown (7.5YR 4/4) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/4), gray (10YR 6/1), and strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable; few clay films; 15 to 30 percent sandstone and shale fragments by volume; very strongly acid.
R—28 inches, shale and sandstone rock.

The solum is 20 to 40 inches thick over bedrock. The A horizon ranges from grayish brown (10YR 5/2) to brown (10YR 5/3) and dark grayish brown (10YR 4/2). In some profiles the B horizon is heavy silt loam. In some profiles the B21 horizon is strong brown (7.5YR 5/6) and the B22 horizon is yellowish brown (10YR 5/6). The B3 horizon is absent from some profiles.

Gilpin soils occur near Whitley, Latham, and Hartsells soils. They are shallower than Whitley soils. They are less clayey in the subsoil than Latham soils and are shallower than those soils. They are less sandy than Hartsells soils.

Gilpin silt loam, 6 to 12 percent slopes (GlC).—This soil has convex slopes and is on long, narrow ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where some subsoil material has been mixed into the plow layer, some areas where the subsoil is silty clay below a depth of 13 inches, and a few areas where slopes are 2 to 6 percent.

This soil is somewhat droughty, but is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to till. The organic-matter content is medium. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 28 inches. The erosion hazard is severe in cultivated areas. Capability unit IIIe–6; woodland group 2.

Gilpin silt loam, 12 to 20 percent slopes (GlD).—This soil has convex slopes and is on upper slopes and ridge crests.

Included with this soil in mapping were some areas where some subsoil material has been mixed into the plow layer and some areas where the subsoil is silty clay below a depth of 13 inches.

This soil is somewhat droughty, but is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to till. Many areas are wooded. Some large areas are used mainly for hay or pasture. The organic-matter content is medium to low. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 26 inches. The erosion hazard is very severe in cultivated areas. Capability unit IVe–3; woodland group 2.

Gilpin silt loam, 12 to 20 percent slopes, severely eroded (GlD3).—This soil is on the upper and middle parts

of convex and concave slopes and, to a minor extent, on ridge crests. It has a surface layer of yellowish-brown light silty clay loam that was originally subsoil material, and it is slightly shallower over bedrock than the typical Gilpin soil.

Included with this soil in mapping were areas where the present surface layer is a mixture of subsoil material and material from the original surface layer, a few small gullied areas, and a few small rock outcrops.

This Gilpin soil is suited to drought-resistant hay crops and pasture plants. It is somewhat difficult to till. The organic-matter content is very low. Crop response to lime and fertilizer is fair to poor. Roots can penetrate to a depth of about 22 inches. The erosion hazard is too severe for this soil to be cultivated. Many areas that were once used for crops and pasture have reverted to woods or brush. Capability unit VIe–3; woodland group 5.

Gilpin silt loam, 20 to 30 percent slopes (GlE).—This soil has convex and concave slopes. It is on the middle and upper parts of slopes. It has a profile that is slightly shallower over bedrock than the one described as representative of the series.

Included with this soil in mapping were some areas where some subsoil material has been mixed into the surface layer and a few small areas where the surface layer is mostly subsoil material.

This soil is somewhat droughty, but is suited to most hay crops and pasture plants commonly grown in the survey area. It is easy to till. Most areas are wooded, but some are used mainly for pasture. The organic-matter content is medium to low. Crops respond fairly well to lime and fertilizer. Roots can penetrate to a depth of about 24 inches. The erosion hazard is too severe for this soil to be cultivated. Capability unit VIe–1; woodland group 7 where slopes face north and east and group 2 where they face south and west.

Gullied Land

Gullied land (12 to 40 percent slopes) (Gu) consists of areas of soils so severely damaged by erosion that the soil profile has been destroyed. Gullies are 2 to 10 feet deep or more, and the ridges between the gullies are very narrow. Most of the remaining soil material is strongly acid. Some areas in the western and northwestern parts of Estill County are alkaline.

These areas are mostly small and have been abandoned. They are growing up in bushes or reverting to woods. Reclamation generally is not economically practical. Capability unit VIIe–2; woodland group 6.

Hartsells Series

The Hartsells series consists of moderately deep, well-drained soils of the uplands, mostly in the norhteastern part of Lee County. These soils are strongly acid to very strongly acid. They formed in residuum derived from acid sandstone. Slopes range from 6 to 12 percent.

In a representative profile, the surface layer is grayish-brown fine sandy loam 6 inches thick. The subsoil is yellowish-brown loam or fine sandy clay loam. Below a depth of 27 inches is mottled yellowish-brown, light brownish-gray, and strong-brown sandy loam that contains a few sandstone fragments. Bedrock is at a depth of 35 inches.

Hartsells soils have low natural fertility and low organic-matter content. Permeability is moderately rapid. The available moisture capacity is moderate.

Representative profile of Hartsells fine sandy loam, 6 to 12 percent slopes; on Ky. Highway 52, one-half mile east of Ky. Highway 399, in Lee County:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.

B1—6 to 14 inches, yellowish-brown (10YR 5/4) loam; weak, fine to medium, subangular blocky structure; friable; very strongly acid; gradual, smooth boundary.

B2t—14 to 27 inches, yellowish-brown (10YR 5/6) fine sandy clay loam; few, fine, faint mottles of strong brown (7.5YR 5/6) in lower part; moderate, medium, subangular blocky structure; friable; few thin clay films; few small sandstone fragments; very strongly acid; gradual, smooth boundary.

C—27 to 35 inches, mottled yellowish-brown (10YR 5/6), light brownish-gray (2.5Y 6/2), and strong-brown (7.5YR 5/6) sandy loam; structureless; friable; few sandstone fragments; very strongly acid.

R—35 inches, acid sandstone.

The solum ranges from 20 to 32 inches in thickness. Depth to rock ranges from 20 to 40 inches. The content of sandstone fragments ranges from 0 to 10 percent. The A horizon ranges from grayish brown (10YR 5/2) to brown (10YR 5/3) and dark grayish brown (10YR 4/2). In wooded areas this soil has a 1- to 2-inch, darker colored A1 horizon. In some profiles the B1 horizon is brownish-yellow (10YR 6/6) fine sandy loam. In some profiles the B2t horizon is strong brown (7.5YR 5/6) and the C horizon is sandy clay loam.

The Hartsells soils in Estill and Lee Counties have a soil temperature a few degrees lower than is defined in the range for the series. This difference, however, does not affect the usefulness or behavior of these soils.

Hartsells soils are near Dekalb and Gilpin soils. They are more clayey in the subsoil than Dekalb soils. They are more sandy than Gilpin soils.

Hartsells fine sandy loam, 6 to 12 percent slopes (HeC).—This soil has convex slopes and is on long, narrow ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where the surface layer is only 3 inches thick, areas where plowing has mixed the surface layer with subsoil material and the present surface layer is brown, areas where slopes are 2 to 6 percent, and some small areas where they are 12 to 20 percent.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Most areas are small, inaccessible, and wooded. Some areas are used mainly for hay or pasture. This soil is easy to till, and crops respond fairly well to lime and fertilizer. Roots can penetrate to a moderate depth. The erosion hazard is severe in cultivated areas. Capability unit IIIe–6; woodland group 1.

Huntington Series

The Huntington series consists of deep, well-drained soils on the flood plain of the Kentucky River and its tributaries in Estill County. These soils are slightly acid. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes are mostly 0 to 4 percent.

In a representative profile, the surface layer is dark-brown silt loam 15 inches thick. The subsoil is brown silt loam and extends to a depth of 50 inches.

Huntington soils are easy to till. They have high natural fertility and high organic-matter content. The available moisture capacity is high.

Representative profile of Huntington silt loam; one-half mile west of Millers' Creek on lower River Road, between the Kentucky River and the railroad, in Estill County:

Ap—0 to 15 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; few roots; slightly acid; clear, smooth boundary.

B2—15 to 50 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; slightly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is 5 to 10 feet or more. The reaction ranges from slightly acid to neutral. In some profiles the A horizon is very dark grayish brown (10YR 3/2). The B2 horizon ranges from brown (10YR 4/3) to dark yellowish brown (10YR 4/4) and dark grayish brown (10YR 4/2).

Huntington soils are near Lindside, Newark, and Bruno soils. They are better drained than Lindside and Newark soils and have a thicker, darker surface layer than those soils. They are less sandy than Bruno soils.

Huntington silt loam (0 to 4 percent slopes) (Hu).—This soil is on wide and narrow stream flood plains.

Included with this soil in mapping were some areas where the surface layer or subsoil is loam, some areas where the subsoil contains thin layers of fine sandy loam, and areas of Huntington soils on the banks of the Kentucky River where slopes are as steep as 20 percent.

This soil is well suited to all field crops, hay crops, and pasture plants commonly grown in the survey area (fig. 9). It is subject to overflow, mostly late in winter and early in spring. Crops respond well to fertilizer. No lime is needed for most crops. Roots can penetrate to a depth of 4 feet or more. Permeability is moderate. The erosion hazard is mostly none to slight. Capability unit I–1; woodland group 8.

Jefferson Series

The Jefferson series consists of deep, well-drained soils on mountainsides. These soils formed in colluvium derived from sandstone and siltstone. Slopes range from 20 to 60 percent.

In a representative profile, the surface layer is 5 inches thick. It is dark-brown and brown loam that is 15 percent small sandstone fragments. The subsoil extends to a depth of 42 inches. To a depth of 17 inches, it is yellowish-brown loam that is 15 percent sandstone fragments. Below a depth of 17 inches, it is strong-brown clay loam or loam that is 20 to 30 percent sandstone fragments. The underlying material extends to a depth of 50 inches and is yellowish-brown loam that is 40 percent sandstone fragments.

Figure 9.—**Harvesting corn on Huntington silt loam. This soil is on flood plains of the Kentucky River.**

Jefferson soils have low natural fertility. Permeability is moderately rapid. The available moisture capacity is high.

The Jefferson soils in Estill and Lee Counties are mapped only with Shelocta soils.

Representative profile of Jefferson loam in an area of Shelocta and Jefferson stony soils, 20 to 60 percent slopes; one-fourth mile north of Ky. Highway 1746, 2 miles north of Ky. Highway 52, about 2 miles east of the Estill County line, in Lee County:

A11—0 to 2 inches, dark-brown (10YR 3/3) loam; weak, medium, granular structure; very friable; many small roots; 15 percent small sandstone fragments; very strongly acid; clear, smooth boundary.

A12—2 to 5 inches, brown (10YR 4/3) loam; weak, medium, granular structure; very friable; many small roots; 15 percent small sandstone fragments; very strongly acid; gradual, smooth boundary.

B1—5 to 17 inches, yellowish-brown (10YR 5/6) heavy loam; weak, fine and medium, subangular blocky structure; friable; common small roots; 15 percent small sandstone fragments; very strongly acid; gradual, smooth boundary.

B2t—17 to 30 inches, strong-brown (7.5YR 5/6) light clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; common thin clay films; 20 percent small sandstone fragments; very strongly acid; gradual, smooth boundary.

B3—30 to 42 inches, strong-brown (7.5YR 5/6) loam; weak, fine and medium, subangular blocky structure; friable; 30 percent sandstone fragments; very strongly acid; gradual, smooth boundary.

C—42 to 50 inches, yellowish-brown (10YR 5/6) loam; common, fine, faint mottles of brown (10YR 5/3); massive; friable; 40 percent sandstone fragments; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to rock is 5 to 8 feet or more. The A horizon ranges from dark brown (10YR 3/3) or brown (10YR 4/3) to dark grayish brown (10YR 4/2) and brown (10YR 5/3). The B1 horizon ranges from 4 to 14 inches in thickness. The B horizon ranges from yellowish brown (10YR 5/6) or strong brown (7.5YR 5/6) to dark yellowish brown (10YR 4/4). In places it is sandy clay loam or heavy sandy loam. Content of coarse fragments ranges from 10 to 25 percent to a depth of about 30 inches and from 20 to 40 percent below a depth of 30 inches. Reaction ranges from strongly acid to very strongly acid.

Jefferson soils are near Brookside, Shelocta, and Latham soils. They are less clayey than Brookside and Latham soils. They contain more sand and less silt than Shelocta soils.

Lanton Series

The Lanton series consists of deep, poorly drained soils on low terraces and in colluvial areas, along the larger tributaries of the Kentucky River in the west-central part of Estill County. These soils are neutral in reaction. They formed in colluvium derived mostly from calcareous shale, siltstone, and limestone. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is very dark gray silt loam 10 inches thick. The subsoil extends to a depth of 46 inches. To a depth of 30 inches, it is very dark gray light silty clay loam that contains a few mottles of light olive brown. Below a depth of 30 inches, it is light olive-brown or olive-brown silty clay loam mottled with dark gray.

Lanton soils are easy to work when they are not wet. They have high natural fertility and high organic-matter content. Permeability is moderately slow. The available moisture capacity is high.

Representative profile of Lanton silt loam, 0 to 2 percent slopes; 3 miles northwest of Ky. Highway 1209 on Ky. Highway 89, in Estill County:

Ap—0 to 10 inches, very dark gray (10YR 3/1) silt loam; weak, medium, granular structure; friable; many roots; neutral; gradual, smooth boundary.

B21g—10 to 30 inches, very dark gray (10YR 3/1) light silty clay loam; few, medium, distinct mottles of light olive brown (2.5Y 5/4) in lower part; weak, fine and medium, subangular blocky structure; friable; few, small, black concretions; neutral; clear, smooth boundary.

B22g—30 to 46 inches, light olive-brown (2.5Y 5/4) or olive-brown (2.5Y 4/4) silty clay loam; common, coarse, distinct mottles of dark gray (10YR 4/1); massive to weak, fine, angular blocky structure; firm, slightly sticky and plastic; common, small, black concretions; neutral.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is 5 to 10 feet or more. The Ap horizon ranges from very dark gray (10YR 3/1) to very dark grayish brown (10YR 3/2) and black (10YR 2/1). In some profiles the Ap horizon is heavy silt loam. The B21g and B22g horizons range from very dark gray (10YR 3/1) or light olive brown (2.5Y 5/4) to dark grayish brown (2.5Y 4/2), grayish brown (2.5Y 5/2), and gray (N 5/0). Mottles in these horizons range from light olive brown (2.5Y 5/4) or dark gray (10YR 4/1) to olive brown (2.5Y 4/4). In some profiles the B22g horizon is heavy silty clay loam.

Lanton soils in Estill and Lee Counties have a soil temperature a few degrees lower than is defined in the range for the series. This difference does not affect the usefulness or behavior of these soils.

Lanton soils are near Purdy, Morehead, and Cruze soils. They have a thicker, darker surface layer than those soils. They are similar in drainage to Purdy soils. They are more poorly drained than Morehead and Cruze soils and are grayer than Cruze soils.

Lanton silt loam, 0 to 2 percent slopes (LoA).—This soil is on colluvial areas adjacent to hills. Slopes are slightly concave.

Included with this soil in mapping were some small areas that have 3 to 6 inches of brown or dark grayish-brown silt loam overwash, a few small areas of Purdy and Morehead soils, and some areas where slopes are 2 to 6 percent.

This Lanton soil is suited to plants that tolerate wetness. If adequate drainage is provided, the soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is not suited to tobacco and alfalfa. Some low areas are occasionally subject to overflow. The water table is within a depth of 6 inches during winter and spring. Wetness is a severe hazard. Tile drainage is feasible if outlets are available. The seasonal high water table restricts root penetration at a depth of about 1½ feet for appreciable periods. Generally no lime is needed. Crops respond well to fertilizer if adequate drainage is provided. Capability unit IIw–2; woodland group 10.

Latham Series

The Latham series consists of deep, moderately well drained and well drained soils of the uplands. These soils occur throughout Lee County and in the mountainous part of Estill County. They are very strongly acid. They formed in residuum derived from acid clay shale that

in some areas contains a small amount of siltstone. Slopes range from 2 to 60 percent.

In a representative profile, the surface layer is brown silt loam about 4 inches thick. The subsoil extends to a depth of 32 inches. It contains some small shale fragments. The upper 6 inches is yellowish-brown heavy silty clay loam. The lower part is strong-brown silty clay or clay mottled with light gray. The underlying material is mottled light-gray, yellowish-brown, and yellowish-red clay to a depth of about 40 inches and light-gray clay mottled with yellowish brown and yellowish red to a depth of about 48 inches. Below this, to a depth of 54 inches, is soft, grayish, acid shale.

Latham soils are easy to till. They have low natural fertility and low organic-matter content. Permeability is slow. The available moisture capacity is moderate to high.

Representative profile of Latham silt loam, 6 to 12 percent slopes; along a gravel road one-half mile south of Ky. Highway 587, 1¼ miles west of Ky. Highway 11, in Lee County:

O1—¼ inch to 0, partly decomposed leaf litter.
A1—0 to 4 inches, brown (10YR 5/3) silt loam; weak, fine and medium, granular structure; very friable; 2 to 5 percent small shale fragments; many small roots; very strongly acid; abrupt, smooth boundary.
B21t—4 to 10 inches, yellowish-brown (10YR 5/6) heavy silty clay loam; weak, medium, subangular blocky structure; firm; few thin clay films; 2 to 5 percent small shale fragments; common small roots; very strongly acid; gradual, smooth boundary.
B22t—10 to 22 inches, strong-brown (7.5YR 5/6) silty clay or clay; moderate, medium, subangular blocky structure; very firm, sticky and plastic; common thin clay films; few small shale fragments; few small roots; very strongly acid; gradual, smooth boundary.
B3—22 to 32 inches, strong-brown (7.5YR 5/8) silty clay or clay; common, medium, distinct mottles of light gray (10YR 7/2); weak, medium, subangular blocky structure; very firm, sticky and plastic; 2 to 5 percent small shale fragments; very strongly acid; gradual, smooth boundary.
C1—32 to 40 inches, mottled light-gray (10YR 7/1) and yellowish-brown (10YR 5/8) clay; a few, fine, distinct mottles of yellowish red (5YR 4/8); relic, platy, shale structure; very firm, sticky and plastic; 15 percent shale fragments; very strongly acid; gradual, smooth boundary.
C2—40 to 48 inches, light-gray (10YR 7/1) clay; common, medium, distinct mottles of yellowish brown (10YR 5/8) and a few of yellowish red (5YR 5/8); relic, platy, shale structure; very firm, sticky and plastic; 30 percent shale fragments; very strongly acid.
R—48 to 54 inches, grayish, acid, soft clay shale.

The solum ranges from 20 to 40 inches in thickness. Depth to hard rock ranges from 6 to 10 feet or more. The A horizon ranges from brown (10YR 5/3) to grayish brown (10YR 5/2) and dark grayish brown (2.5Y 4/2) in color and from 2 to 7 inches in thickness. The B2 horizon ranges from yellowish brown (10YR 5/4) and reddish yellow (7.5YR 6/6) to strong brown (7.5YR 5/6), and the B3 horizon from strong brown (7.5YR 5/8) to yellowish brown (10YR 5/4) and light yellowish brown (2.5Y 6/4). The C horizon ranges from light gray (10YR 7/1) to grayish brown (2.5Y 5/2) and light brownish gray (10YR 6/2).

Latham soils are near Whitley, Gilpin, and Shelocta soils. They are deeper and more clayey than Gilpin soils, which are underlain by sandstone and shale. They are more clayey than Whitley soils, which are underlain by hard rock siltstone and shale. They are more clayey and contain fewer rock fragments than Shelocta soils, which formed in colluvium.

Latham silt loam, 6 to 12 percent slopes (LbC).—This soil has convex slopes and is on narrow to wide ridgetops of some mountains. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where slopes are 2 to 6 percent, some where subsoil material has been mixed into the surface layer by plowing, a few areas where the plow layer is mostly subsoil material, some areas where the upper part of the subsoil is yellowish red and the lower part is mottled yellowish brown and yellowish red, and a few small areas of Whitley soils.

This Latham soil is suited to most of the field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 32 inches. The erosion hazard is severe in cultivated areas. About half the acreage is wooded. Capability unit IIIe–3; woodland group 3.

Latham silt loam, 12 to 20 percent slopes (LbD).—This soil occupies the upper slopes and ridge crests of some mountains. Slopes are mostly convex.

Included with this soil in mapping were some areas where subsoil material has been mixed into the surface layer by plowing, a few small areas where the plow layer is mostly subsoil material, a few areas where slopes are 20 to 30 percent, and some areas where the upper part of the subsoil is yellowish red and the lower part is mottled yellowish brown and yellowish red.

Most of the acreage is wooded. Some areas are used for hay or pasture. A few are used for row crops. This soil is suited to most hay and pasture plants commonly grown in the survey area. Occasionally a row crop can be grown. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 25 inches. The erosion hazard is very severe in cultivated areas. Capability unit IVe–3; woodland group 3.

Latham-Shelocta complex, 20 to 30 percent slopes (LcE).—This mapping unit is about 60 percent Latham soils and about 40 percent Shelocta soils. It occupies upper slopes and ridge crests in the mountainous part of Estill County and in the western part of Lee County. In the central and eastern parts of Lee County, it extends from the ridgetops to the valley floor.

The Latham soil occupies the upper slopes and crests and has mostly convex slopes. It has the profile described as representative of the series.

The Shelocta soil occupies the lower slopes and has mostly straight or concave slopes. It has the profile described as representative of the Shelocta series. Its surface layer is about 4 inches thick and is 5 to 15 percent siltstone fragments. Its subsoil is 10 to 30 percent siltstone fragments.

Included with these soils in mapping were some areas of a Latham soil that is 5 to 15 percent shale or siltstone fragments; a few small areas of Gilpin, Jefferson, and Dekalb soils; and a few areas of sandstone rock outcrop.

Most of the acreage is wooded. Some areas are used mostly for pasture. Most of the commonly grown pasture plants are suited. Crops respond fairly well to well to lime and fertilizer. Roots can penetrate to a depth of about 25 inches in the Latham soil and 48 inches in the Shelocta soil. Siltstone fragments in the Shelocta soil

make tillage somewhat difficult. The erosion hazard is too severe for these soils to be used for cultivation. Capability unit VIe–1; woodland group 7.

Latham-Shelocta complex, 30 to 60 percent slopes (LcF).—This mapping unit is about 60 percent Latham soils and 40 percent Shelocta soils. It occupies upper slopes in the mountainous part of Estill County and in the western part of Lee County. In the central and eastern parts of Lee County, it extends from the ridgetops to the valley floor.

The Latham soil occupies the upper slopes and crests and has mostly straight or convex slopes. The Shelocta soil occupies the lower slopes and has mostly straight or concave slopes.

Included with these soils in mapping were some areas of a Latham soil that is 5 to 15 percent shale or siltstone fragments; a few small areas of Jefferson, Dekalb, and Gilpin soils; a few sandstone or siltstone outcrops; and in Estill County, just above the limestone escarpments, a few narrow bands of rocky limestone soils.

These soils are too steep to be suitable for cultivation. They are suited to trees or to limited grazing of hardy pasture plants. The steep slopes make pasture management difficult. Slopes are too steep for the use of modern farm machinery. Roots can penetrate to a depth of about 25 inches in the Latham soil and 48 inches in the Shelocta soil. Crops respond fairly well to lime and fertilizer. Most areas are wooded or are reverting to woods. Capability unit VIIe–1; woodland group 7.

Lindside Series

The Lindside series consists of deep, moderately well drained soils of the bottom lands, on the flood plains of the Kentucky River and its tributaries in Estill County. These soils are neutral in reaction. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is brown silt loam 8 inches thick. The subsoil extends to a depth of 27 inches. It is dark grayish-brown silt loam below a depth of 16 inches mottled with light brownish gray, grayish brown, and dark brown. The underlying material extends to a depth of 42 inches and is olive-gray silt loam mottled with brown and grayish brown or dark grayish brown.

Lindside soils are easy to till. They have a high natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Lindside silt loam; 1 mile west of Pitts Road on Ky. Highway 52 at the foot of Tipton Mountain, in Estill County:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; few small roots; neutral; clear, smooth boundary.

B21—8 to 16 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; neutral; gradual, smooth boundary.

B22—16 to 27 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, faint mottles of light brownish gray (10YR 6/2) and grayish brown (10YR 5/2); few, fine, distinct mottles of dark brown; weak, fine, granular structure; friable; neutral; gradual, smooth boundary.

C—27 to 42 inches, olive-gray (5Y 5/2) silt loam; common, medium, distinct mottles of brown (10YR 4/3) and common, medium, faint mottles of grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2); massive; friable; many, small, dark-brown concretions; neutral.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is 5 to 10 feet or more. The Ap horizon ranges from brown (10YR 4/3) to dark brown (10YR 3/3) and dark grayish brown (10YR 4/2). In some profiles the B21 horizon is brown (10YR 4/3), the B22 horizon is grayish brown (10YR 5/2); and the C horizon is olive gray (5Y 5/2). Mottles in the B22 and C horizons range from light brownish gray (10YR 6/2), grayish brown (10YR 5/2), and dark grayish brown (2.5Y 4/2) to yellowish brown (10YR 5/4) and olive brown (2.5Y 4/4). The C horizon is light silty clay loam in places. The reaction ranges from neutral to slightly acid throughout the profile.

Lindside soils in Estill and Lee Counties have yellower hues in the C horizon than is defined in the range for the series. This difference does not alter the usefulness or behavior of these soils.

Lindside soils are near Huntington and Newark soils. They are not so well drained as Huntington soils and have a thinner, lighter colored surface layer than those soils. They are better drained than Newark soils.

Lindside silt loam (0 to 2 percent slope) (ld).—This soil is on stream flood plains.

Included with this soil in mapping were some areas where the surface layer is loam, areas where the subsoil contains thin layers of fine sandy loam, and a few small areas of Newark and Huntington soils.

This Lindside soil is well suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is subject to overflow, mostly in late winter or early spring. Crops respond well to fertilizer, and no lime is needed for most crops. Roots can penetrate to a depth of 4 feet or more, but the water table is at a depth of 2½ to 3 feet during winter and spring. No drainage is needed for most crops, but tile drains reduce the danger of damage to tobacco and alfalfa during wet years. The erosion hazard is none to slight. Capability unit I–2; woodland group 9.

Melvin Series

The Melvin series consists of deep, poorly drained soils of the bottom lands, in low flat areas and depressions of flood plains of the Kentucky River and its large tributaries in Estill County. These soils are neutral to slightly acid. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is 7 inches thick. It is grayish-brown silt loam mottled with dark brown. The subsoil extends to a depth of 50 inches and is olive-gray silt loam mottled with dark brown and strong brown.

Melvin soils are easy to till when they are not wet. They have moderate natural fertility and low organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Melvin silt loam; 2½ miles southwest of the Station Camp Post Office near Red Creek, in Estill County:

Ap—0 to 7 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, distinct mottles of dark brown (10YR 4/3); weak, fine, granular structure; very friable; common roots; neutral; clear, smooth boundary.

Bg—7 to 50 inches, olive-gray (5Y 5/2) silt loam in 80 percent of mass; common, fine to medium, distinct mottles of dark brown (10YR 4/3) and strong brown (7.5YR 5/6); weak, fine, granular structure; many roots and pores; friable; slightly acid.

The solum ranges from 18 to 50 inches in thickness. Depth to bedrock is 5 to 10 feet or more. The Ap horizon ranges from grayish brown (2.5Y 5/2) to light brownish gray (2.5Y 6/2) and olive gray (5Y 5/2). Mottles in this horizon range from dark brown to yellowish brown (10YR 5/4) and olive brown (2.5Y 4/4). The B horizon ranges from olive gray (5Y 5/2) to dark gray (10YR 4/1) mottled with yellowish brown.

Melvin soils are near Newark and Purdy soils. They are more poorly drained and grayer than Newark soils. They are less clayey in the subsoil than Purdy soils.

Melvin silt loam (0 to 2 percent slopes) (Me).—This soil is in level areas or in slight depressions on flood plains of larger streams.

Included with this soil in mapping were some areas where the surface layer is loam or fine sandy loam and areas where the subsoil contains thin layers of loam or fine sandy loam.

This soil is suited to plants that tolerate wetness. If adequate drainage is provided, the soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is not suited to tobacco and alfalfa. Most areas are subject to overflow. The water table is within a depth of 6 inches during winter and spring, and the hazard of wetness is severe. Tile drainage systems work well if outlets are available. Crops respond well to fertilizer if adequate drainage is provided. No lime is needed for most crops. In undrained areas, root penetration is restricted for appreciable periods by a water table at a depth of about 1 foot. Capability unit IIIw–1; woodland group 10.

Monongahela Series

The Monongahela series consists of moderately well drained soils that have a fragipan. These soils occur on old, high terraces along former channels of the Kentucky River, mostly on high ridgetops near the river, in the northwestern part of Estill County. They are strongly acid. They formed in alluvium derived from sandstone, siltstone, and shale. Slopes range from 2 to 6 percent.

In a representative profile, the surface layer is brown fine sandy loam 6 inches thick. The subsoil extends to a depth of 42 inches. To a depth of 11 inches, it is light yellowish-brown light sandy clay loam. The next 12 inches is yellowish-brown light clay loam that contains a few mottles of strong brown and light gray. Below this is a firm compacted fragipan. The upper part is light brownish-gray light clay loam mottled with yellowish brown and pale brown. The lower part is mottled yellowish-brown, light brownish-gray, light-gray, strong-brown, and yellowish-red heavy clay loam. The underlying material extends to a depth of 51 inches and is yellowish-brown heavy clay loam mottled with light gray, yellowish red, and light yellowish brown.

Monongahela soils are easy to till. They have low natural fertility. Permeability is slow in the fragipan, and the water table is at a depth of 1½ to 2 feet during winter and spring. The available moisture capacity is moderate.

Representative profile of Monongahela fine sandy loam, 2 to 6 percent slopes; 2½ miles northwest of Ky. Highway 89 at Palmer, in Estill County:

Ap—0 to 6 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.

B1—6 to 11 inches, light yellowish-brown (10YR 6/4) light sandy clay loam; weak, fine, subangular blocky structure; friable; few roots; very strongly acid; gradual, smooth boundary.

B2t—11 to 23 inches, yellowish-brown (10YR 5/4 to 5/6) light clay loam; few, fine, distinct mottles of strong brown (7.5YR 5/6) and light gray (2.5Y 7/2) below a depth of 20 inches; weak, medium, subangular blocky structure; friable; patchy thin clay films; few, small, black concretions; few roots and pores; very strongly acid; gradual, smooth boundary.

Bx1—23 to 30 inches, light brownish-gray (2.5Y 6/2) light clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/4 and 5/6) and pale brown (10YR 6/3); few, fine, faint, light yellowish-brown (2.5Y 6/4) mottles; moderate, medium, blocky structure; firm and brittle; few black concretions; patchy thin clay films; very strongly acid; clear, smooth boundary.

Bx2—30 to 42 inches, mottled yellowish-brown (10YR 5/6), light brownish-gray (2.5Y 6/2), light-gray (2.5Y 7/2), strong-brown (7.5YR 5/6 to 5/8), and yellowish-red (5YR 5/6) heavy clay loam; moderate, medium, blocky structure; firm and brittle; few black concretions; patchy thin clay films; few pockets of dark grayish-brown clay; very strongly acid; gradual, smooth boundary.

C—42 to 51 inches, yellowish-brown (10YR 5/6) heavy clay loam; common, medium, distinct mottles of light gray (2.5Y 7/2), yellowish-red (5YR 5/6), and light yellowish brown (2.5Y 6/4); massive; firm, slightly sticky and plastic; pockets of dark grayish-brown clay and pockets of stratified sandy clay; very strongly acid.

The solum ranges from 3 to 5 feet in thickness. Depth to bedrock is 5 to 10 feet or more. The A horizon ranges from brown (10YR 5/3) to brown (10YR 4/3) and grayish brown (10YR 5/2). In some profiles the B1 horizon is yellowish brown (10YR 5/6) and the B2t horizon is brownish-yellow heavy loam. Depth to the fragipan, or Bx1 horizon, ranges from 18 to 25 inches.

Monongahela soils are near Allegheny, Trappist, and Colyer soils. They are less well drained than Allegheny soils, which do not have a fragipan. They are sandier and deeper than Trappist and Colyer soils, which formed in residuum derived from black shale and also do not have a fragipan.

Monongahela fine sandy loam, 2 to 6 percent slopes (MoB).—This soil has convex slopes and is on wide, long ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where slopes are 6 to 12 percent, a few small areas where slopes are 0 to 2 percent, some areas that have a surface layer of loam, and some that have some subsoil material mixed into the surface layer by plowing.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Alfalfa can be damaged by excess water in the root zone, mostly in late winter or early spring. Crops respond well to lime and fertilizer, and the organic-matter content is medium to low. Roots can penetrate as far down as the fragipan. The erosion hazard is moderate in cultivated areas. Capability unit IIe–3; woodland group 4.

Morehead Series

The Morehead series consists of deep, somewhat poorly drained soils on low terraces, along the Kentucky River and its larger tributaries in Estill County, and, to a minor extent, in Lee County. These soils are very strongly acid. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam 7 inches thick. The subsoil extends to a depth of 48 inches. To a depth of 13 inches, it is olive-brown silt loam. Below a depth of 13 inches, it is light brownish-gray light silty clay loam mottled with dark yellowish brown. Below a depth of 28 inches, it is light-gray light silty clay loam mottled with yellowish brown.

Morehead soils are easy to till when they are not wet. They have low natural fertility and low organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Morehead silt loam; three-fourths of a mile south of Ky. Highway 499 at Wisemantown, in Estill County:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, granular structure; very friable; common small roots; very strongly acid; clear, smooth boundary.

B1—7 to 13 inches, olive-brown (2.5Y 4/4) silt loam; weak, fine and medium, subangular blocky structure; friable; common small roots; very strongly acid; gradual, smooth boundary.

B2tg—13 to 28 inches, light brownish-gray (2.5Y 6/2) light silty clay loam; many, medium, distinct mottles of dark yellowish brown (10YR 4/4); moderate, medium and coarse, subangular blocky structure; firm; patchy thin clay films and silt coatings; few small roots; very strongly acid; gradual, smooth boundary.

B3tg—28 to 48 inches, light-gray (10YR 6/1) light silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); weak, fine and medium, subangular blocky structure; firm; few small roots; few, small, black concretions; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock ranges from 6 to 10 feet. The A horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3) and grayish brown (2.5Y 5/2). The B1 horizon ranges from olive brown (2.5Y 4/4) to yellowish brown (10YR 5/4 and 5/6). The B2 and B3 horizons range from light brownish gray (2.5Y 6/2) or light gray (10YR 6/1) to light brownish gray (10YR 6/2) and grayish brown (2.5Y 5/2). Mottles in these horizons range from dark yellowish brown (10YR 4/4) or yellowish brown (10YR 5/6) to strong brown (7.5YR 5/6) and olive brown (2.5Y 4/4). The B horizon ranges from heavy silt loam to light silty clay loam.

Morehead soils are near Purdy and Elk soils. They are not so poorly drained as Purdy soils and have less clay in the subsoil than those soils. They are more poorly drained and grayer than Elk soils.

Morehead silt loam (0 to 4 percent slopes) (Mr).—This soil is on broad low terraces. Slopes are slightly concave.

Included with this soil in mapping were a few small areas of Purdy soil and a few moderately well drained areas where slopes are 2 to 6 percent.

This Morehead soil is suited to plants that tolerate wetness. If adequate drainage is provided, it is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is not suited to tobacco and alfalfa. Some low areas are subject to overflow, mostly late in winter or early in spring. The water table is at a depth of ½ foot to 1½ feet during winter and spring, and wetness is a severe hazard. Tile drains relieve the wetness, but outlets are scarce in some areas. The seasonal high water table restricts root penetration at a depth of about 2 feet for appreciable periods. Crops respond well to lime and fertilizer if adequate drainage is provided. Capability unit IIw–3; woodland group 9.

Muse Series

The Muse series consists of deep, well-drained soils of toe slopes and colluvial areas, in the west-central and northwestern parts of Estill County. These soils are strongly acid. They former in colluvium derived from acid shale. Slopes range from 6 to 20 percent.

In a representative profile, the surface layer is brown silt loam 7 inches thick. The subsoil extends to a depth of 36 inches. To a depth of 13 inches, it is strong-brown silty clay loam. Between depths of 13 and 32 inches, it is strong-brown heavy silty clay loam. Below a depth of 32 inches, it is yellowish-red silty clay mottled with light brownish gray, yellowish brown, and brown. The underlying material is mottled red, strong-brown, yellowish-red, and light brownish-gray silty clay that is 10 percent black shale fragments. Bedrock is at a depth of about 52 inches.

Muse soils are easy to till. They have moderate natural fertility. Permeability is moderately slow. The available moisture capacity is high.

Representative profile of Muse silt loam, 6 to 12 percent slopes; 0.8 mile north of Ky. Highway 52 on Ky. Highway 1457, in Estill County:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; few roots; strongly acid; clear, smooth boundary.

B1t—7 to 13 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, medium, subangular blocky structure; friable; few thin clay films; few small roots; 1 percent small shale fragments; strongly acid; gradual, smooth boundary.

B2t—13 to 32 inches, strong-brown (7.5YR 5/8) heavy silty clay loam; moderate, fine or medium, subangular and angular blocky structure; firm; 1 percent black shale fragments; firm, sticky and slightly plastic; common clay films; very strongly acid; gradual, smooth boundary.

B3t—32 to 36 inches, yellowish-red (5YR 4/6) silty clay; common, medium, distinct, light brownish-gray (10YR 6/2) mottles, common, medium, faint, yellowish-brown (10YR 5/8) mottles, and few, fine, faint, brown (10YR 5/3) mottles; weak, medium, subangular blocky structure; firm, slightly sticky and plastic; 5 percent small black shale fragments; common clay films; few, small, dark-brown concretions; very strongly acid; clear, smooth boundary.

C—36 to 52 inches, mottled red (2.5YR 4/6), strong-brown, (7.5YR 5/8), yellowish-red (5YR 4/6), and light brownish-gray (10YR 6/2) silty clay; weak, medium, subangular blocky structure; firm; 10 percent small black shale fragments; abrupt, wavy boundary.

R—52 inches, brittle black shale.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock ranges from 4 to 6 feet. The A horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4). The B1t horizon ranges from strong brown (7.5YR 5/6) to brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4). The B2 and B3 horizons range from strong brown (7.5YR 5/8) or yellowish red (5YR 4/6) to brown (7.5YR 4/4), reddish brown

(5YR 4/4), and yellowish red (5YR 5/6). The B1t horizon ranges from light silty clay loam to heavy silty clay loam. The rest of the B horizon ranges from heavy silty clay loam to silty clay.

Muse soils are near Cruze, Captina, Colyer, and Trappist soils. They are better drained than Cruze or Captina soils, they have a more reddish subsoil than those soils, and they do not have the fragipan that is typical of Captina soils. They are deeper than Colyer or Trappist soils.

Muse silt loam, 6 to 12 percent slopes (MsC).—This soil occupies colluvial areas and toe slopes at the foot of some hills. Slopes are mostly concave. This soil has the profile described as representative of the series.

Included with this soil in mapping were some areas where the surface layer has some subsoil material mixed into it by plowing, a few small areas of Trappist soils, and some areas where slopes are 2 to 6 percent.

This Muse soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. The organic-matter content is medium. Roots can penetrate to a depth of about 4 feet. The erosion hazard is severe in cultivated areas. Capability unit IIIe–2; woodland group 3.

Muse silt loam, 12 to 20 percent slopes (MsD).—This soil occupies colluvial areas and toe slopes at the foot of some hills. Slopes are mostly concave. This soil has a surface layer that has some subsoil material mixed into it by plowing, and it is slightly shallower over bedrock than the soil in the profile described as representative of the series.

Included with this soil in mapping were a few areas where the plow layer is mostly subsoil material and some areas of Trappist soils.

This Muse soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. The organic-matter content is low. Roots can penetrate to a depth of about 40 inches. The erosion hazard is very severe in cultivated areas. Capability unit IVe–2; woodland group 3.

Newark Series

The Newark series consists of deep, somewhat poorly drained soils on flood plains along the Kentucky River and its tributaries in Estill County. These soils are neutral to slightly acid. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam 7 inches thick. The subsoil extends to a depth of 18 inches and is dark grayish-brown silt loam mottled with dark brown. The underlying material extends to a depth of 50 inches and is light brownish-gray silt loam mottled with olive gray, yellowish brown, and dark brown.

Newark soils are easy to till. They have high natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Newark silt loam; 2½ miles southwest of Station Camp Post Office on Ky. Highway 594, in Estill County:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; numerous fine roots and pores; neutral; clear, smooth boundary.

B2g—7 to 18 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, faint mottles of dark brown (10YR 4/3); weak, fine, granular structure; very friable; pockets of stratified fine sandy loam; neutral; clear, smooth boundary.

Cg—18 to 50 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, faint mottles of olive gray (5Y 5/2) and common, fine, distinct mottles of yellowish brown (10YR 5/4) and dark brown (7.5YR 3/2); massive; friable; few fine roots; few fine pores; neutral.

The solum ranges from 18 to 30 inches in thickness. Depth to bedrock is 5 to 10 feet or more. The A horizon ranges from dark grayish brown (10YR 4/2) to very dark grayish brown (10YR 3/2), brown (10YR 4/3), and grayish brown (10YR 5/2 or 2.5Y 5/2). In some areas the B horizon is light olive brown (2.5Y 5/4), dark yellowish brown (10YR 4/4), or yellowish brown (10YR 5/4) mottled with gray to a depth of 16 inches. In some profiles the C horizon is light silty clay loam.

Newark soils are near Huntington, Lindside, and Melvin soils. They are more poorly drained and have grayer colors than Huntington and Lindside soils, and they lack the thick, dark-colored surface layer of Huntington soils. They are not so poorly drained nor so gray as Melvin soils.

Newark silt loam (0 to 2 percent slopes) (Ne).—This soil is on stream flood plains.

Included with this soil in mapping were some areas that have a loam surface layer and areas where the subsoil has thin layers of loam and fine sandy loam. Also included are a few areas of Lindside and Melvin soils.

This soil is suited to crops that tolerate moderate wetness. If adequate drainage is provided, it is suited to most crops. It is not suited to alfalfa. Most areas are subject to overflow, mostly late in winter or early in spring. Crops respond well to fertilizer. No lime is needed for most crops. The water table is at a depth of ½ foot to 1½ feet during winter and spring, and wetness is a moderate hazard. The water table restricts root penetration at a depth of about 2 feet for appreciable periods. Tile drains work well, but outlets are scarce in some areas. Capability unit IIw–1; woodland group 9.

Pope Series

The Pope series consists of deep, well-drained soils on flood plains along the Kentucky River and its tributaries in Lee County. These soils are strongly acid. They formed in alluvium derived from acid shale, siltstone, and sandstone. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is dark-brown loam 8 inches thick. The subsoil extends to a depth of 52 inches. To a depth of 20 inches, it is brown loam. Below a depth of 20 inches, it is dark yellowish-brown loam.

Pope soils are easy to till. They have moderate natural fertility and medium organic-matter content. Permeability is moderately rapid. The available moisture capacity is high.

Representative profile of Pope loam; 100 yards east of bridge at Heidelberg on north side of Kentucky River, in Lee County:

Ap—0 to 8 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable; few roots; strongly acid; clear, smooth boundary.

B21—8 to 20 inches, brown (10YR 4/3) loam; weak, fine, granular structure; very friable; few small roots; strongly acid; gradual, smooth boundary.

B22—20 to 52 inches, dark yellowish-brown (10YR 4/4) loam; weak, fine and medium, granular structure; friable; few black concretions; a few small roots; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock is 5 to 10 feet or more. The A horizon ranges from dark brown (10YR 3/3) to brown (10YR 4/3) and dark grayish brown (10YR 4/2). The B21 horizon is brown (10YR 4/3) or dark yellowish brown (10YR 4/4). The B22 horizon ranges from dark yellowish brown (10YR 4/4) to dark grayish brown (10YR 4/2).

The subsoil of Pope soils in Estill and Lee Counties contains slightly more clay than that defined as the range of the series. This difference does not affect the usefulness or behavior of these soils.

Pope soils are near Bruno, Cuba, and Stendal soils. They are less sandy than Bruno soils. They are sandier than Cuba and Stendal soils, and they do not have the grayish subsoil that is typical of Stendal soils.

Pope loam (0 to 4 percent slopes) (Po).—This soil is in long, narrow strips on banks and natural levees of streams.

Included with this soil in mapping were some areas where the surface layer is fine sandy loam and some areas where the subsoil contains thin layers of fine sandy loam. These areas are slightly droughty. Also included were areas of Pope soils on streambanks where slopes are as steep as 20 percent.

This Pope soil is suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Most areas are subject to overflow, mostly late in winter or early in spring. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is mostly none to slight, but it is moderate where slopes are more than 6 percent. Capability unit I–1; woodland group 8.

Purdy Series

The Purdy series consists of deep, poorly drained soils on low terraces in depressions and flats along the Kentucky River and its larger tributaries in Estill County. These soils are strongly acid to very strongly acid. They formed in alluvium derived from shale, siltstone, sandstone, and limestone. Slopes range from 0 to 2 percent.

In a representative profile, the surface layer is 4 inches thick. It is grayish-brown silt loam mottled with yellowish brown. Below a depth of 10 inches, it is light-gray heavy silty clay loam mottled with yellowish brown, dark yellowish brown, and strong brown. The underlying material extends to a depth of 56 inches and is light-gray heavy silty clay loam mottled with strong brown and yellowish brown.

Purdy soils have low natural fertility and low organic-matter content. Permeability is moderately slow. The available moisture capacity is high.

Representative profile of Purdy silt loam; 500 yards south of Ky. Highway 499 at Wisemantown, in Estill County:

Ap—0 to 4 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, faint mottles of yellowish brown (10YR 5/4); moderate, medium, granular structure; very friable; many small roots; strongly acid; clear, wavy boundary.

B1g—4 to 10 inches, light-gray (10YR 6/1) heavy silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, medium, subangular blocky structure; friable; common small roots; very strongly acid; clear, smooth boundary.

B21tg—10 to 18 inches, light-gray (10YR 6/1) heavy silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4); moderate, medium and coarse, subangular blocky structure; firm; common silt coatings and clay films; common small roots; very strongly acid; gradual, wavy boundary.

B22tg—18 to 44 inches, light-gray (N 6/0) heavy silty clay loam; many, medium, prominent mottles of strong brown (7.5YR 5/8); moderate, medium and coarse, subangular blocky structure; firm; common silt coatings and clay films; few small roots; very strongly acid; gradual, wavy boundary.

Cg—44 to 56 inches, light-gray (N 6/0) heavy silty clay loam; many, medium, prominent mottles of strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; firm; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is 5 to 20 feet. The A horizon ranges from 2 to 6 inches in thickness and from grayish brown (2.5Y 5/2) to light brownish gray (2.5Y 6/2) and dark grayish brown (2.5Y 4/2). Mottles in this horizon range from yellowish brown (10YR 5/4) to light gray (10YR 7/1) and gray (10YR 5/1). The B horizon ranges from light gray to gray (10YR 5/1) or light brownish gray (2.5Y 6/2) and light olive gray (5Y 6/2).

Purdy soils are near Morehead and Melvin soils. They are more poorly drained, grayer, and more clayey in the subsoil than Morehead soils. They are more clayey in the subsoil than Melvin soils.

Purdy silt loam (0 to 2 percent slopes) (Pu).—This soil is on broad flats or slight depressions of low terraces.

Included with this soil in mapping were a few small areas of Morehead soils.

This Purdy soil is suited to plants that tolerate long periods of wetness. Most areas are used for pasture, and some are wooded. Some areas are subject to overflow. The water table is within a depth of 6 inches during winter and spring, and wetness is a very severe hazard. The feasibility of tile drainage is questionable, and outlets are scarce in most areas. Unless drainage is adequate, crop response to lime and fertilizer is fair to poor. This soil is easy to till if it is not wet. The seasonal high water table restricts root penetration at a depth of about 1 foot for appreciable periods. Capability unit IVw–1; woodland group 10.

Ramsey Series

The Ramsey series consists of shallow, somewhat excessively drained soils of the uplands, mostly in the northwestern part of Lee County. These soils are very strongly acid. They formed in residuum derived from acid sandstone. Slopes range from 6 to 20 percent.

In a representative profile, the surface layer is about 5 inches thick. The upper 2 inches is very dark grayish-brown fine sandy loam that is 5 percent sandstone fragments. The lower 3 inches is brown fine sandy loam that is 10 percent sandstone fragments. The subsoil extends to a depth of 15 inches. To a depth of about 12 inches, it is yellowish-brown fine sandy loam that is 25 percent sandstone fragments. Below a depth of about 12 inches, it is brownish-yellow fine sandy loam that is 45 percent sandstone fragments. Bedrock is at a depth of 15 inches.

Ramsey soils have low natural fertility and low or-

ganic-matter content. Permeability is rapid. The available moisture capacity is low.

The Ramsey soils in Estill and Lee Counties are mapped only with Dekalb soils and Rock outcrop.

Representative profile of Ramsey fine sandy loam in an area of Dekalb-Ramsey-Rock outcrop complex, 12 to 20 percent slopes; one-fourth mile north of Ky. Highway 1746, 2 miles north of Ky. Highway 52, in Lee County:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many small roots; 5 percent sandstone fragments; very strongly acid; clear, smooth boundary.

A2—2 to 5 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; few small roots; 10 percent sandstone fragments; very strongly acid; gradual, smooth boundary.

B21—5 to 12 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, medium, granular structure and weak, fine, subangular blocky; friable; few small roots; 25 percent sandstone fragments; very strongly acid; gradual, smooth boundary.

B22—12 to 15 inches, brownish-yellow (10YR 6/6) fine sandy loam; weak, fine, granular and subangular blocky structure; friable; 45 percent sandstone fragments; very strongly acid.

R—15 inches, sandstone rock.

The solum is 10 to 20 inches thick over bedrock. In some profiles the A1 horizon is dark grayish brown (10YR 4/2) and the A2 horizon is pale brown (10YR 6/3). In some profiles the A1 and A2 horizons have been mixed together by plowing, and the Ap horizon, or plow layer, ranges from brown (10YR 4/3) to grayish brown (10YR 5/2). The B horizon ranges from yellowish brown (10YR 5/4) or brownish yellow (10YR 6/6) to strong brown (7.5YR 5/6).

Ramsey soils are near Dekalb, Gilpin, and Hartsells soils. They are shallower over bedrock than Dekalb, Gilpin, and Hartsells soils. They are sandier than Gilpin soils.

Shelocta Series

The Shelocta series consists of deep, well-drained soils of the uplands, throughout Lee County and in the mountainous part of Estill County. These soils are strongly acid. They formed in colluvium derived from shale, siltstone, and sandstone. Slopes range from 2 to 60 percent.

In a representative profile, the surface layer is dark grayish-brown silt loam 8 inches thick that is 2 to 4 percent small shale fragments. The subsoil extends to a depth of 45 inches and is silty clay loam that is 10 to 20 percent small rock fragments. To a depth of 17 inches, it is yellowish brown. Between depths of 17 and 33 inches, it is strong brown. Below a depth of 33 inches, it is yellowish brown mottled with light gray, light brownish gray, and dark yellowish brown. The underlying material extends to a depth of 52 inches and is yellowish-brown light silty clay loam that is 30 to 40 percent rock fragments.

Shelocta soils have moderate natural fertility. Permeability is moderate. The available moisture capacity is high.

Representative profile of Shelocta silt loam, 6 to 12 percent slopes; 1 mile south of the Wolf County Line on Big Andy Ridge Road, in Lee County:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; many roots; 2 to 4 percent small shale fragments; strongly acid; clear, smooth boundary.

B21t—8 to 17 inches, yellowish-brown (10YR 5/6) light silty clay loam; weak, medium, subangular blocky structure; friable to firm, slightly sticky and plastic; few roots; many thin clay films; 10 to 15 percent coarse fragments; very strongly acid; gradual, smooth boundary.

B22t—17 to 33 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; thin, continuous clay films; few small roots; 10 to 20 percent coarse fragments; very strongly acid; gradual, smooth boundary.

B3—33 to 45 inches, yellowish-brown (10YR 5/6 to 5/8) silty clay loam; common, distinct mottles of light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) and common, medium, faint mottles of dark yellowish brown (10YR 4/4); weak, medium, subangular blocky structure; slightly sticky and plastic; thin patches of clay films; 10 to 20 percent small and coarse fragments; very strongly acid; gradual, smooth boundary.

C—45 to 52 inches, yellowish-brown (10YR 5/4 to 5/6) light silty clay loam and weathered shale and siltstone of light gray, light brownish gray, dark brown, and pale brown; weak, medium, subangular blocky structure; slightly sticky and plastic; 30 to 40 percent coarse fragments; very strongly acid.

The solum ranges from 3 to 4 feet in thickness. Depth to bedrock is 4 to 8 feet. The Ap horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3) and grayish brown (10YR 5/2). In wooded areas A1 and A2 horizons occur. The A1 horizon is dark grayish brown (10YR 4/2) or very dark grayish brown (10YR 3/2) and is 1 to 3 inches thick. The A2 horizon is brown (10YR 5/3) or grayish brown (10YR 5/2) and is 3 to 5 inches thick. The percentage of coarse fragments in the A horizon ranges from 5 to 15 where soils are steep. The B horizon ranges from yellowish brown (10YR 5/6 to 5/8) or strong brown (7.5YR 5/6) to brown (7.5YR 5/4) and dark yellowish brown (10YR 4/4).

Shelocta soils are near Latham, Muse, and Brookside soils. They are less clayey and contain more rock fragments than Latham soils. They are less clayey, are yellower, and contain more rock fragments than Muse soils. They are less clayey and more acid than Brookside soils.

Shelocta silt loam, 2 to 6 percent slopes (SeB).—This soil mostly has concave slopes and occupies long, narrow, colluvial areas between stream flood plains and mountainsides. In a few places it is either on benchlike areas between areas of steeper soils or in depressions around sinkholes.

Included with this soil in mapping were some areas where the surface layer has some subsoil material mixed into it by plowing and a few small areas where the plow layer is mostly subsoil material.

This soil is suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to till. Crops respond well to lime and fertilizer. The organic-matter content is medium. Roots can penetrate to a depth of about 4 feet. The erosion hazard is moderate in cultivated areas. Capability unit IIe–4; woodland group 1.

Shelocta silt loam, 6 to 12 percent slopes (SeC).—This soil mostly has concave slopes and occupies long, narrow, colluvial areas between stream flood plains and mountainsides. In a few places it is either on benchlike areas between areas of steeper soils or in depressions around sinkholes. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where the surface layer has some subsoil material mixed into it by plowing, a few small areas where the plow layer is mostly subsoil material, some areas where the surface layer is loam, and a few areas where the surface

layer contains enough gravel to make tillage somewhat difficult.

This soil is suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to till. Crops respond well to lime and fertilizer. The organic-matter content is medium. Roots can penetrate to a depth of about 4 feet. The erosion hazard is severe in cultivated areas. Capability unit IIIe–5; woodland group 1.

Shelocta silt loam, 12 to 20 percent slopes (SeD).—This soil has concave slopes and mostly occupies long, narrow, colluvial areas between stream flood plains and mountainsides. In a few places it is either on benchlike areas between areas of steeper soils or in depressions around sinkholes.

Included with this soil in mapping were some areas of Latham soils, some areas of a soil that is similar to Shelocta soils in the upper part but is clayey in the lower part of the subsoil, a few areas where the surface layer has some subsoil material mixed into it by plowing, a few small areas where the plow layer is mostly subsoil material, and some areas where the surface layer contains enough gravel to make tillage somewhat difficult.

This Shelocta soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to till. Crops respond well to lime and fertilizer. The organic-matter content is medium. Roots can penetrate to a depth of about 4 feet. The erosion hazard is very severe in cultivated areas. Capability unit IVe–1; woodland group 1.

Shelocta gravelly silt loam, 20 to 60 percent slopes (SlF).—This soil has concave and convex slopes and is mostly on the lower half of mountainsides in Estill County. In a few places in Lee County it is on lower slopes. The surface layer is about 4 inches thick and is 5 to 15 percent siltstone fragments. The subsoil is 15 to 25 percent siltstone fragments.

Included with this soil in mapping were some areas of Latham soils and a few areas of shallow channery soils.

This Shelocta soil is suited to trees (fig. 10). A few small areas that are only moderately steep are suited to hardy pasture plants. The gravel content makes this soil somewhat difficult to till. Most slopes are too steep for the use of modern farm machinery. Crops respond fairly well to lime and fertilizer, and the organic-matter content is low. Roots can penetrate to a depth of about 4 feet. This soil is too steep and has too severe an erosion hazard for cultivation. Capability unit VIIe–1; woodland group 7.

Shelocta and Jefferson stony soils, 20 to 60 percent slopes (SoF).—This mapping unit is on mountainsides.

The Jefferson soil is below nearly continuous sandstone escarpments. It has straight slopes where it occupies upper and middle slopes and slightly concave slopes where it occupies lower slopes. It has the profile described as representative of the series. Its surface layer is about

Figure 10.—**Area of Shelocta gravelly silt loam, 20 to 60 percent slopes, planted to Christmas trees.**

5 inches thick and is 15 percent small sandstone fragments. Its subsoil is 15 to 30 percent small and large sandstone fragments. About 5 to 10 percent of the surface is large boulders that have broken off the sandstone escarpment.

The Shelocta soil is on long divides that extend from the sandstone escarpments and on lower lying slopes below the Jefferson soil. It has mostly convex slopes but has concave slopes where it occupies some lower slopes. Its surface layer is about 4 inches thick and is 5 to 15 percent siltstone fragments. Its subsoil is 15 to 25 percent siltstone fragments.

Included with these soils in mapping were some Latham soils, some areas that are not stony or gravelly, and some sandstone rock outcrops.

The rock fragments in the surface layer make these soils somewhat difficult to till. Most slopes are too steep for the use of modern farm machinery. Most of the acreage is wooded, but a few moderately steep areas are used for pasture. Roots can penetrate to a depth of about 4 feet. These soils are suited to trees. They are too steep and the erosion hazard is too severe for cultivation. A few small moderately steep areas are suited to limited grazing of hardy pasture plants. Capability unit VIIe–1; woodland group 7.

Shrouts Series

The Shrouts series consists of somewhat droughty soils of the uplands, in the west-central and northwestern parts of Estill County. These soils are neutral to moderately alkaline. They formed in residuum derived from calcareous clay shale. Slopes range from 12 to 40 percent.

In a representative profile, the surface layer is dark grayish-brown silty clay loam 6 inches thick. The subsoil, about 7 inches thick, is olive-gray silty clay or clay mottled with light olive brown, olive, and dark grayish brown. It is underlain by gray to olive-gray clay that contains common olive and greenish-gray shale fragments and extends to a depth of 34 inches. Below this is greenish-gray, soft clayey shale that extends to a depth of 4 feet.

Shrouts soils have moderate natural fertility. Permeability is slow. The available moisture capacity is low.

Representative profile of Shrouts silty clay loam, 12 to 30 percent slopes; 1¼ miles southwest of Thomas School on Ky. Highway 499 near the Madison County line, in Estill County:

Ap—0 to 6 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; moderate, fine, granular structure; friable; many roots; neutral; clear, smooth boundary.

B2—6 to 13 inches, olive-gray (5Y 4/2) silty clay or clay; many, medium, distinct mottles of light olive brown (2.5Y 5/4 to 5/6), olive (5Y 5/4), and dark grayish brown (2.5Y 4/2; moderate, medium, prismatic structure; very hard, very firm, sticky and plastic; few roots; continuous clay films; moderately alkaline; clear, smooth boundary.

C—13 to 34 inches, gray (5Y 5/1) to olive-gray (5Y 5/2) clay; massive; very hard, extremely firm, very sticky and plastic; common olive and greenish-gray shale fragments; moderately alkaline; calcareous; clear, smooth boundary.

R—34 inches, greenish-gray (5GY 5/1 to 5G 6/1), soft, clayey shale; calcareous; moderately alkaline.

The solum ranges from 10 to 20 inches in thickness. Depth to hard bedrock is 5 to 10 feet. In some profiles the A horizon is grayish brown (10YR 5/2). The B horizon ranges from olive gray (5Y 5/2) to grayish brown (2.5Y 5/2) and light olive gray (5Y 6/2). The C horizon ranges from gray (5Y 5/1) to light olive gray (5Y 6/2) and dark gray (5Y 4/1). There are thin layers of brown limestone in the C horizon of some profiles.

Shrouts soils are near Fairmount and Colyer soils. They have a lighter colored surface layer and are deeper over bedrock than Fairmount soils. They are deeper than Colyer soils and do not have the black shale fragments and the acid reaction that are typical of those soils.

Shrouts silty clay loam, 12 to 30 percent slopes (SrE).—This soil is on lower slopes and, to a minor extent, on low ridges where slopes are convex. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where slopes are 6 to 12 percent; some areas where some subsoil material has been mixed into the surface layer; a few, small, brown limestone outcrops; and some areas where the plow layer is dark brown and the subsoil is silty clay underlain by soft, calcareous shale and siltstone at a depth of 2 to 3 feet.

This soil is suited to drought-resistant hay crops and pasture plants or to woods. The clay content of the surface layer makes this soil somewhat difficult to till. The organic-matter content is low. Crops respond fairly well to fertilizer. No lime is needed. The extremely firm clay layer at a depth of about 13 inches restricts root penetration. This soil is droughty. The erosion hazard is too severe for this soil to be used for cultivated crops. Capability unit VIe–2; woodland group 5.

Shrouts clay, 12 to 40 percent slopes, severely eroded (SsE3).—This soil is on lower slopes of hillsides and, to a to a minor extent, on low ridges where slopes are convex. Most or all of the original surface layer has been lost through erosion, and the present surface layer is clay.

Included with this soil in mapping were a few small outcrops of brown limestone; some small areas of a Shrouts soil that is not severely eroded; some small areas of Gullied land; and some areas where the surface layer is silty clay loam, the lower part of the subsoil is loam, limestone is at a depth of 20 to 40 inches, and 10 to 50 percent of the soil mass is siltstone fragments.

This Shrouts soil is suited to woods. In areas that are not too steep, it can be used for limited grazing of drought-resistant pasture plants. Most areas are growing up in brush or reverting to woods. The high clay content of the surface layer makes this soil difficult to till. The organic-matter content is very low. Crop response to fertilizer is poor. No lime is needed. The extremely firm clay layer restricts root penetration to a depth of about 8 inches. This soil is very droughty. The erosion hazard is too severe and, for the most part, slopes are too steep for this soil to be used for cultivated crops. Capability unit VIIe–2; woodland group 6.

Stendal Series

The Stendal series consists of deep, somewhat poorly drained soils of the bottom lands, along the Kentucky River and its tributaries in Lee County. These soils are strongly acid. They formed in alluvium derived from siltstone, shale, and sandstone. Slopes range from 0 to 4 percent.

In a representative profile, the surface layer is brown silt loam 8 inches thick. The subsoil extends to a depth of 22 inches. To a depth of about 16 inches, it is brown silt loam mottled with light brownish gray. Below a depth of 16 inches, it is grayish-brown silt loam mottled with yellowish brown and dark brown. The underlying material extends to a depth of 48 inches and is light brownish-gray silt loam mottled with dark yellowish brown.

Stendal soils have moderate natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Stendal silt loam; one-half mile south of Williba on private road west of road to Canyon Falls, in Lee County:

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; very friable; strongly acid; clear, smooth boundary.

B21—8 to 16 inches, brown (10YR 4/3) silt loam; many, fine, faint mottles of light brownish gray (10YR 6/2); weak, medium, granular structure; very friable; strongly acid; gradual, smooth boundary.

B22g—16 to 22 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/8) and dark brown (10YR 3/3); weak, medium, granular structure; very friable; strongly acid; gradual, smooth boundary.

Cg—22 to 48 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, distinct mottles of dark yellowish brown (10YR 4/4); massive; very friable; 5 percent coarse fragments of sandstone and shale below a depth of 36 inches; very strongly acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is 5 to 10 feet. The A horizon ranges from brown (10YR 4/3) to dark grayish brown (10YR 4/2). The B22 and Cg horizons range from grayish brown (2.5Y 5/2) or light brownish gray (2.5Y 6/2) to light gray (10YR 6/1) and gray (10YR 5/1) and from loam to light silty clay loam.

The soil mapped as Stendal gravelly silt loam in Estill and Lee Counties contains slightly more gravel than is defined in the range for the series. This difference does not affect the usefulness or behavior of this soil.

Stendal soils are near Cuba, Pope, Bonnie, and Shelocta soils. They are less well drained than Cuba and Pope soils and have a grayer subsoil than those soils. They are not so poorly drained nor so gray as Bonnie soils. They are grayer than Shelocta soils and are not so well drained as these soils, which are on colluvial slopes.

Stendal silt loam (0 to 2 percent slopes) (St).—This soil is on flood plains of the Kentucky River and its tributaries. It has the profile described as representative of the series.

Included with this soil in mapping were some areas where the surface layer or subsoil is loam or fine sandy loam, a few small gravelly areas, and a few small areas of Clifty and Bonnie soils.

This Stendal soil is suited to plants that tolerate wetness. If adequate drainage is provided, it is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is not suited to tobacco and alfalfa. Most areas are subject to overflow. The water table is at a depth of ½ foot to 1½ feet during winter and spring. Wetness is a moderate hazard. The seasonal high water table restricts root penetration at a depth of about 2 feet for appreciable periods. Tile drains work well, but outlets are scarce in some areas. If adequate drainage is provided, crops respond well to lime and fertilizer and the soil is easy to till. Capability unit IIw–1; woodland group 9.

Stendal gravelly silt loam (0 to 4 percent slopes) (Su).—This soil is mostly on long narrow flood plains of small streams. Gravel makes up 10 to 15 percent of the surface layer and subsoil.

Included with this soil in mapping were some areas where the surface layer and subsoil are gravelly loam or fine sandy loam, a few small nongravelly areas, and a few small areas of Clifty and Bonnie soils.

This Stendal soil is suited to plants that tolerate wetness. If adequate drainage is provided, it is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is not suited to tobacco and alfalfa. The water table is at a depth of ½ foot to 1½ feet during winter and spring, and the wetness hazard is moderate. The seasonal high water table restricts root penetration at a depth of about 2 feet for appreciable periods. Tile drains work well. Crops respond well to lime and fertilizer if adequate drainage is provided. The gravel content makes this soil somewhat difficult to till. Capability unit IIw–1; woodland group 9.

Trappist Series

The Trappist series consists of moderately deep, well-drained soils of the uplands, in the west-central and northwestern parts of Estill County. These soils are medium acid to strongly acid. They formed in residuum derived from black shale. Slopes range from 2 to 12 percent.

In a representative profile, the surface layer is dark-brown silt loam 7 inches thick. The subsoil extends to a depth of 32 inches. To a depth of about 11 inches, it is strong-brown silty clay loam. Between depths of 11 and 28 inches, it is strong-brown heavy silty clay loam or silty clay. Below a depth of 28 inches, it is yellowish-brown to dark yellowish-brown silty clay that contains common small shale fragments. Bedrock is at a depth of 32 inches.

Trappist soils have high available moisture capacity. Permeability is moderately slow.

Representative profile of Trappist silt loam, 6 to 12 percent slopes; 1¾ miles northwest of Ky. Highway 499 at Thomas School, in Estill County:

Ap—0 to 7 inches, dark-brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; very friable; many roots; medium acid; clear, smooth boundary.

B1t—7 to 11 inches, strong-brown (7.5YR 5/6) silty clay loam; moderate, fine, subangular blocky structure; friable to firm; few clay films; few small roots; few small shale fragments; strongly acid; gradual, smooth boundary.

B2t—11 to 28 inches, strong-brown (7.5YR 5/6) heavy silty clay loam or silty clay; strong, fine and medium, subangular blocky structure; firm, sticky and slightly plastic; common clay films; few shale fragments; very strongly acid; gradual, smooth boundary.

B3t—28 to 32 inches, yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) silty clay; weak, medium, subangular blocky structure; slightly sticky and plastic; few clay films; common small shale fragments; very strongly acid; gradual, smooth boundary.

R—32 inches, black, highly fissile shale.

The solum is 20 to 40 inches thick over bedrock. The A horizon ranges from dark brown (10YR 4/3) to brown (10YR 5/3) and dark yellowish brown (10YR 4/4). The B horizon ranges from strong brown (7.5YR 5/6) or yellowish brown (10YR 5/4) to yellowish red (5YR 4/6) and brown

(7.5YR 4/4). In some profiles the B3 horizon has some grayish mottles and is 5 to 35 percent shale fragments.

Trappish soils are near Colyer and Muse soils. They are deeper than Colyer soils and contain fewer shale fragments in the subsoil than those soils. They are not so deep as Muse soils, which are on colluvial slopes.

Trappist silt loam, 2 to 6 percent slopes (TrB).—This soil has convex slopes and is on long, narrow to fairly wide ridgetops.

Included with this soil in mapping were some areas where some subsoil material has been mixed into the plow layer and a few small areas of Colyer soils, most of which have slopes of 4 to 8 percent.

This Trappist soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to till. It has low natural fertility, but crops respond well to lime and fertilizer. The organic-matter content is medium. Roots can penetrate to a depth of 20 to 40 inches. The erosion hazard is moderate in cultivated areas. Capability unit IIe–2; woodland group 3.

Trappist silt loam, 6 to 12 percent slopes (TrC).—This soil has convex slopes and is on long, narrow to fairly wide ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were some areas, generally along small drainageways, where the surface layer is yellowish-brown or dark yellowish-brown material that consists mostly of subsoil material; some small areas of Colyer soils; and some soils that are similar to Colyer soils, but contain only a few shale fragments in the subsoil.

This Trappist soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. It is easy to fairly easy to till. It has low natural fertility, but crops respond well to lime and fertilizer. The organic-matter content is medium to low. Roots can penetrate to a depth of 20 to 40 inches. The erosion hazard is severe in cultivated areas. Capability unit IIIe–3; woodland group 3.

Whitley Series

The Whitley series consists of deep, well-drained soils of the uplands, throughout Lee County and in the mountainous part of Estill County. These soils are strongly acid to very strongly acid. They formed in residuum derived from siltstone, shale, and sandstone. Slopes range from 2 to 20 percent.

In a representative profile, the surface layer is 7 inches thick. In the upper 1½ inches, it is very dark grayish-brown silt loam. The lower part is grayish-brown silt loam. The subsoil extends to a depth of 31 inches. To a depth of about 13 inches, it is yellowish-brown silt loam. Below a depth of 13 inches, it is strong-brown light silty clay loam. The underlying material is massive, strong-brown light silty clay loam over partly weathered shale and silt loam. Shale and siltstone bedrock is at a depth of 48 inches.

Whitley soils are easy to till. They have moderate natural fertility and medium organic-matter content. Permeability is moderate. The available moisture capacity is high.

Representative profile of Whitley silt loam, 2 to 6 percent slopes; 2 miles south of Beattyville on Ky. Highway 11, in Lee County:

O1—1½ inches to 0, mull, leaves, and pine needles.
A1—0 to 1½ inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, smooth boundary.
A2—1½ to 7 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable; few roots; very strongly acid; clear, smooth boundary.
B1—7 to 13 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable; few roots; very strongly acid; clear, smooth boundary.
B21t—13 to 21 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate to strong, medium, subangular blocky structure; firm; few roots; very strongly acid; gradual, smooth boundary.
B22t—21 to 31 inches, strong-brown (7.5YR 5/6) light silty clay loam; weak, fine, faint mottles of pale brown (10YR 6/3); moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; very strongly acid; gradual, smooth boundary.
C1—31 to 37 inches, strong-brown (7.5YR 5/6) light silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/4); massive; firm; very strongly acid; gradual, smooth boundary.
C2—37 to 48 inches, partly weathered shale and silt loam.
R—48 inches, brown shale and siltstone.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is 40 to 60 inches. In cultivated areas the plow layer is dark grayish brown (10YR 4/2), brown (10YR 5/3), or grayish brown (10YR 5/2). The B horizon ranges from yellowish brown (10YR 5/6) or strong brown (7.5YR 5/6) to brown (7.5YR 4/4) and yellowish red (5YR 4/6).

Whitley soils are near Gilpin and Latham soils. They are deeper than Gilpin soils. They are less clayey than Latham soils.

Whitley silt loam, 2 to 6 percent slopes (WhB).—This soil has convex slopes and is on the long wide ridgetops of some mountains. It has the profile described as representative of the series. Where used for crops and pasture, it has a surface layer of brown silt loam about 7 inches thick.

Included with this soil in mapping were some areas where the surface layer has some subsoil material mixed into it by plowing, a few areas of Gilpin soils, and a few areas where slopes are nearly level.

This Whitley soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 3 feet. The erosion hazard is moderate in cultivated areas. Capability unit IIe–1; woodland group 1.

Whitley silt loam, 6 to 12 percent slopes (WhC).—This soil has convex slopes and is on the long wide ridgetops of some mountains. Where used for crops and pasture, it has a plow layer of brown silt loam about 7 inches thick.

Included with this soil in mapping were some areas where the surface layer has some subsoil material mixed into it by plowing, a few small areas where the plow layer is mostly subsoil material, and a few small areas of Gilpin soils.

This Whitley soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area (fig. 11). Some rather large areas remain wooded. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 3 feet. The erosion hazard

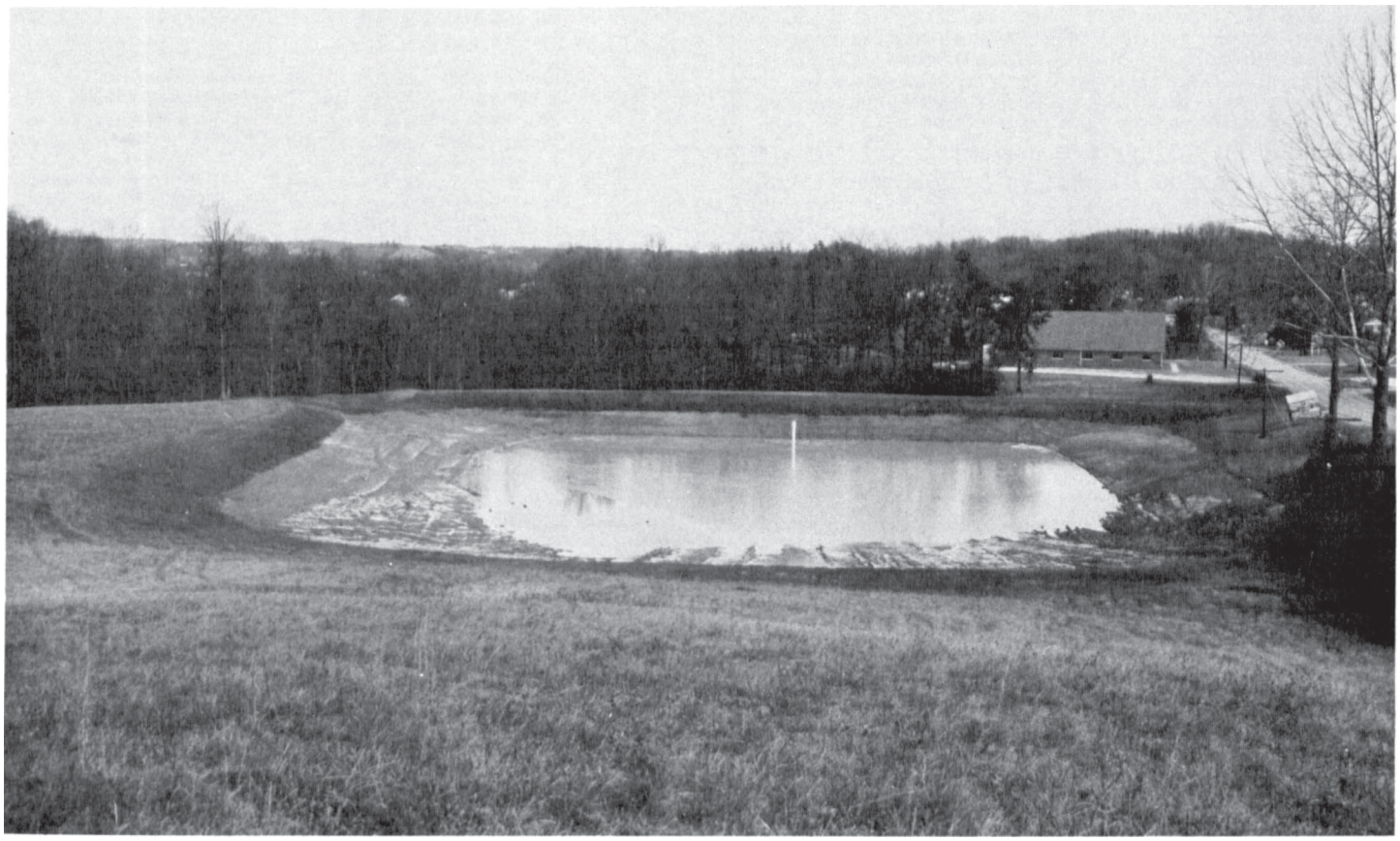

Figure 11.—Area of Whitley silt loam, 6 to 12 percent slopes, planted to Kentucky 31 fescue and redclover. The farm pond in the background provides water for livestock and recreation.

is severe in cultivated areas. Capability unit IIIe–1; woodland group 1.

Whitley silt loam, 12 to 20 percent slopes (WhD).—This soil has mostly convex slopes and is on upper slopes and ridge crests of some mountains. Where used for crops or pasture it has a surface layer of brown silt loam about 7 inches thick.

Included with this soil in mapping were some areas where the surface layer has some subsoil material mixed into it by plowing, a few areas where the plow layer is mostly subsoil material, and some areas of Gilpin soils.

Most of the acreage of this Whitley soil is wooded. Some areas are used for pasture, and a few are used for crops in some years. This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to lime and fertilizer. Roots can penetrate to a depth of about 3 feet. The erosion hazard is severe in cultivated areas. Capability unit IVe–1; woodland group 1.

Woolper Series

The Woolper series consists of deep, well-drained soils of colluvial areas, in the west-central and northwestern parts of Estill County. These soils are neutral in reaction. They formed in colluvium derived from limestone or calcareous siltstone and shale. Slopes range from 6 to 12 percent.

In a representative profile, the surface layer is very dark gray silty clay loam 8 inches thick. The subsoil extends to a depth of about 44 inches. To a depth of about 17 inches, it is very dark brown heavy silty clay loam. The next 15 inches is very dark grayish-brown silty clay. Below this is dark-brown silty clay or clay. The underlying material extends to a depth of 51 inches and is dark yellowish-brown clay mottled with brown, light olive brown, and olive brown.

Woolper soils have high natural fertility and high organic-matter content. Permeability is moderately slow. The available moisture capacity is high.

Representative profile of Woolper silty clay loam, 6 to 12 percent slopes; 300 yards northeast of the Calloway Creek Bridge on Ky. Highway 89, in Estill County:

Ap—0 to 8 inches, very dark gray (10YR 3/1) silty clay loam; moderate, medium and fine, granular structure; friable, slightly sticky and plastic; many small roots; few, small, dark-brown concretions; neutral; gradual, smooth boundary.

B1t—8 to 17 inches, very dark brown (10YR 2/2) heavy silty clay loam; moderate to weak, fine, subangular blocky structure; firm, slightly sticky and plastic; thin, discontinuous clay films; few small roots; few to common dark-brown concretions; neutral; gradual, smooth boundary.

B2t—17 to 32 inches, very dark grayish-brown (10YR 3/2) silty clay; moderate to strong, fine and medium, subangular and angular blocky structure; firm,

sticky and plastic; some peds slightly variegated with dark brown (10YR 4/3); many clay films; common dark-brown concretions; few chert and limestone fragments; mildly alkaline; gradual, smooth boundary.

B3t—32 to 44 inches, dark-brown (10YR 3/3) silty clay or clay; few, fine, faint variegations of brown (10YR 5/3); moderate, fine and medium, subangular or angular blocky structure; firm, very sticky and plastic; many clay films; few limestone and chert fragments; common brown and few black concretions; mildly alkaline; gradual, smooth boundary.

C—44 to 51 inches, dark yellowish-brown (10YR 3/4) clay; common, fine, faint mottles of brown (10YR 5/3) and common, fine, distinct mottles of light olive brown (2.5Y 5/4) to olive brown (2.5Y 4/4); massive to weak, coarse, blocky structure; firm, sticky and plastic; many brown and black concretions; mildly alkaline; gradual, smooth boundary.

The solum ranges from 36 to 50 inches in thickness. Depth to bedrock is 5 to 10 feet. The A and B1 horizons range from very dark gray (10YR 3/1) or very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3). These two horizons combined range from 12 to 24 inches in thickness. The B2, B3, and C horizons range from very dark grayish brown (10YR 3/2), dark brown (10YR 3/3), or dark yellowish brown (10YR 3/4) to brown (10YR 4/3) and dark yellowish brown (10YR 3/4 and 4/4). In places the surface area and the profile are 1 to 5 percent small limestone fragments and flagstones.

Woolper soils are near Fairmount and Huntington soils. They are deeper and have a thicker, dark-colored surface layer than Fairmount soils. They are more clayey than Huntington soils.

Woolper silty clay loam, 6 to 12 percent slopes (WoC).—This soil has concave slopes and is on long, narrow to wide colluvial areas at the base of some hills.

Included with this soil in mapping were some areas where slopes are 12 to 20 percent, a few small areas that are slightly wet as a result of seepage from adjacent hillsides, and a few small areas where slopes are 2 to 6 percent.

This soil is suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Crops respond well to fertilizer. No lime is needed. The clay content of the surface layer makes this soil somewhat difficult to till. Roots can penetrate to a depth of 4 feet or more. The erosion hazard is severe in cultivated areas. Capability unit IIIe–2; woodland group 3.

Use of Soils for Crops and Pasture[2]

This section is a guide to the suitability and management of soils for crops and pasture. Specific management is not suggested for each soil. Suggestions for the use of each soil are given in the section "Descriptions of the Soils."

This section has three main parts. The first part defines general principles of soil management as they apply to the soils of Estill and Lee Counties. The second part explains the capability grouping of soils and describes the capability units. The third part estimates yields of suitable crops for each soil under high and medium levels of management.

[2] Prepared with the collaboration of WALTER J. GUERNSEY, conservation agronomist, Soil Conservation Service.

General Principles of Soil Management

Some principles of management are general enough to apply to soils on all farms in the survey area, although the individual soils or groups of soils require different kinds and degrees of management. These general principles are described in the following paragraphs. The management of specified groups of soils is suggested under "Management by Capability Units."

On many soils in the survey area, additions of lime, fertilizer, or both are needed. The amounts depend on the natural content of lime and plant nutrients, on past cropping and management, on the need of the crop, and on the level of yield desired. Suggestions for additions of lime and fertilizer are only general in this survey, because such additions should be based on laboratory analyses of soil samples.

The soils of Estill and Lee Counties are naturally low in organic-matter content, and building up this content is not economical. It is important, however, to maintain a supply of organic matter by adding farm manure, leaving plant residue on the surface, and growing sod crops, cover crops, and green-manure crops.

Tillage is needed to prepare a seedbed and to control weeds, but it should be kept to a minimum because it generally tends to break down soil structure. Adding organic matter and growing sod crops, cover crops, and green-manure crops also help to prevent breakdown of structure.

All sloping cultivated soils in the survey area are susceptible to erosion and to loss of organic matter and plant nutrients from the surface layer. Because most erosion occurs while the cultivated crop is growing or soon after it has been harvested, a cropping sequence should be selected that keeps loss of soil and water to a minimum. This cropping sequence is most effective if used with one or more other practices of erosion control. These practices are contour farming, terracing, stripcropping, constructing diversions, seeding grass in waterways, using minimum tillage, using crop residue effectively, seeding cover crops, and applying fertilizer and lime if needed.

On most wet soils in the survey area, yields of cultivated crops can be increased by removing excess water through open ditches or tile drains. Tile drains are expensive to install, but they generally provide better drainage than open ditches. Soils that have a fragipan are difficult to drain, however, and can be drained better by open ditches than by tile. Open ditches are most effective if they intercept the water as it moves horizontally on top of the pan. Suitable outlets are required for drainage by either tile or open ditches.

The local Soil Conservation Service technician can assist in planning the proper combination of practices.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of farming. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are farmed, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other

characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering.

In the capability system, the kinds of soil are grouped at three levels: the capability class, the subclass, and the unit. These are described in the following paragraphs. The capability classification of any soil in the survey area can be learned by referring to the "Guide to Mapping Units."

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None in Estill and Lee Counties.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, and water supply, or to esthetic purposes. (None in Estill and Lee Counties.)

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States but not in Estill and Lee Counties, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, although they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages, the capability units are described and suitable crops and management for the soils are suggested. The names of soil series represented are mentioned in the description of each capability unit, but this does not mean that all soils in a given series are in the unit. To find the names of all the soils in a given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I–1

This unit consists mostly of nearly level soils of the Cuba, Huntington, and Pope series on flood plains. In a few areas these soils are gently sloping or sloping.

These soils have a surface layer of silt loam or loam and are easy to till. They are deep and well drained. Available moisture capacity is high, and organic-matter content is medium or high. The Pope soil contains less clay and more sand than the other soils. It has moderately rapid permeability, and the other soils have moderate permeability. The Huntington soil is neutral to slightly acid, and the other soils are strongly acid. The response to fertilizer is good. The hazard of erosion is none to slight in cultivated areas. Flooding, mostly late in winter or early in spring, is a slight hazard.

These soils are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Corn and tobacco can be grown in the same area year after year. Suitable hay crops and pasture plants are bluegrass, orchardgrass, fescue, timothy, red clover, Ladino clover, and lespedeza. Alfalfa and small grain grow well, but they are subject to damage from flooding.

CAPABILITY UNIT I–2

Lindside silt loam is the only soil in this unit. It is nearly level and is on flood plains.

This soil is easy to till. It is deep, moderately well drained, and neutral to slightly acid. Available moisture capacity is high, and permeability is moderate. The water

table is at a depth of 2½ to 3 feet during winter and spring, and flooding is a slight hazard. The response to fertilizer is good. The hazard of erosion is none to slight in cultivated areas.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Corn and tobacco can be grown in the same area year after year. Suitable hay crops and pasture plants are bluegrass, orchardgrass, fescue, timothy, red clover, Ladino clover, and lespedeza. Alfalfa and small grain can be damaged by flooding. Internal drainage can be improved by tile drains.

CAPABILITY UNIT I-3

Elk silt loam, 0 to 2 percent slopes, is the only soil in this unit. It is nearly level and is on stream terraces slightly higher than flood plains.

This soil is easy to till. It is deep, well drained, and strongly acid. Available moisture capacity is high, and permeability is moderate. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is none to slight in cultivated areas.

This soil is suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Corn, tobacco, and small grain can be grown in the same area year after year. Suitable hay crops and pasture plants are bluegrass, orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

CAPABILITY UNIT IIe-1

This unit consists of gently sloping soils of the Whitley and Elk series on uplands or stream terraces.

These soils are easy to till. They are deep, well drained, and strongly acid. Available moisture capacity is high, and permeability is moderate. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

These soils are suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such legumes and grasses as bluegrass, orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIe-2

This unit consists of gently sloping soils of the Trappist and Cruze series on uplands or colluvial areas.

These soils are easy to till. They have a silt loam plow layer and a clayey subsoil. Permeability is moderately slow. The Trappist soil is moderately deep and well drained. The Cruze soil is deep and moderately well drained or well drained. Both are strongly acid. Available moisture capacity is high, but root penetration is restricted at a depth of 20 to 40 inches. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas. Cruze soils have a water table within 2½ to 3 feet of the surface during winter and spring.

These soils are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such grasses and legumes as orchardgrass, fescue, timothy, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIe-3

This unit consists of gently sloping soils of the Captina and Monongahela series on stream terraces and old high terraces on ridgetops near the Kentucky River.

These soils are moderately well drained and strongly acid. They have a fragipan at a depth of about 22 or 23 inches that restricts root penetration. Available moisture capacity is moderate, and permeability is slow. The organic-matter content is medium to low. The response to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas. The water table is at a depth of 1½ to 2 feet during winter and spring.

These soils are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, and such grasses and legumes as orchardgrass, fescue, timothy, red clover, Ladino clover, and lespedeza (fig. 12). Alfalfa and small grain can be damaged by excess water in the root zone, mostly late in winter or early in spring.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIe-4

This unit consists of gently sloping soils of the Shelocta and Allegheny series on colluvial areas and terraces.

These soils are deep, well drained, and strongly acid to very strongly acid. The gravel in the surface layer of Allegheny gravelly loam makes this soil somewhat difficult to till. With the exception of Allegheny loam, the subsoil of these soils is 10 to 25 percent gravel. Available moisture capacity is high, and permeability is moderate. Organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is moderate in cultivated areas.

These soils are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such grasses and legumes as orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIw-1

This unit consists of nearly level soils of the Newark and Stendal series on flood plains.

These soils are deep and somewhat poorly drained. The Newark soil is slightly acid to neutral, and the Stendal soils are strongly acid. The gravel in the surface layer of Stendal gravelly silt loam makes this soil somewhat difficult to till. Available moisture capacity is high, and permeability is moderate. The water table is at a depth

Figure 12.—Kentucky 31 fescue and Ladino clover pasture on Monongahela fine sandy loam, 2 to 6 percent slopes. This soil is in capability unit IIe-3.

of ½ foot to 1½ feet during winter and spring, and flooding is a hazard. Tile drains work well, but outlets are scarce in some areas. Unless adequate drainage is provided, the seasonal high water table restricts root penetration to a depth of about 2 feet for appreciable periods. The response to fertilizer is good if the soil is adequately drained.

If adequate drainage is provided, corn can be grown in the same area year after year. Suitable plants for undrained areas are fescue, redtop, red clover, Ladino clover, lespedeza, and reed canarygrass.

CAPABILITY UNIT IIw-2

Lanton silt loam, 0 to 2 percent slopes, is the only soil in this unit. It is nearly level and is on low lying terraces and colluvial areas.

This soil is poorly drained and is neutral in reaction. Available moisture capacity is high, and permeability is moderately slow. The water table is within a depth of 6 inches during winter and spring, and flooding is a hazard in some low lying areas. Tile drains are feasible if outlets are available. Unless adequate drainage is provided, the seasonal high water table restricts root penetration to a depth of about 1½ feet for appreciable periods. The organic-matter content is high. The response to fertilizer is good if the soil is adequately drained.

If adequate drainage is provided, corn can be grown in the same area year after year. This soil is not generally suited to tobacco, alfalfa, or small grain. Suitable plants for undrained areas are fescue, Ladino clover, and reed canarygrass.

CAPABILITY UNIT IIw-3

Morehead silt loam is the only soil in this unit. It is a nearly level soil on broad, low-lying terraces.

This soil is somewhat poorly drained and very strongly acid. Available moisture capacity is high, and permeability is moderate. The water table is at a depth of ½ foot to 1½ feet during winter and spring, and flooding is a hazard in some areas. Tile drains are satisfactory in most areas if outlets are available. Unless adequate drainage is provided, the seasonal high water table restricts root penetration at a depth of about 2 feet for appreciable periods. If adequate drainage is provided, the response to lime and fertilizer is fair to good.

If adequate drainage is provided, corn can be grown in the same area year after year. This soil is not well suited to tobacco, alfalfa, or small grain. Suitable plants for undrained areas are fescue, timothy, red clover, Ladino clover, lespedeza, and reed canarygrass.

CAPABILITY UNIT IIs-1

Clifty gravelly silt loam is the only soil in this unit. It is a nearly level soil on flood plains of small streams.

This soil is well drained and medium acid to very strongly acid. The gravel in the surface layer makes

this soil somewhat difficult to till. Available moisture capacity is moderate, and permeability is moderately rapid. This soil is slightly droughty. The high content of gravel results in low available moisture capacity and low plant nutrients, which restrict root penetration below a depth of 24 inches. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is none to slight in cultivated areas. Occasional floods of short duration are a hazard.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Corn and tobacco can be grown in the same area year after year. Suitable hay crops and pasture plants are orchardgrass, fescue, timothy, red clover, Ladino clover, and lespedeza. Alfalfa and small grain can be damaged by flooding.

CAPABILITY UNIT IIIe–1

This unit consists of sloping soils of the Whitley and Elk series on uplands or stream terraces.

These soils are deep, well drained, and strongly acid. Available moisture capacity is high, and permeability is moderate. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

These soils are suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such grasses and legumes as bluegrass, orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good cover.

CAPABILITY UNIT IIIe–2

This unit consists of sloping soils of the Muse and Woolper series on colluvial areas.

These soils are deep, well drained, and neutral to strongly acid. They have a clayey subsoil. Available moisture capacity is high, and permeability is moderately slow. The Woolper soil has high organic-matter content, but the clay content of the surface layer makes it somewhat difficult to till. The Muse soil has medium organic-matter content and is easy to till. The response to fertilizer is good. The hazard of erosion is severe in cultivated areas.

These soils are suited to all field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such grasses and legumes as bluegrass, orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good cover.

CAPABILITY UNIT IIIe–3

This unit consists of sloping soils of the Cruze, Trappist, and Latham series on uplands or colluvial areas.

These soils are strongly acid to very strongly acid. They have a clayey subsoil. Available moisture capacity is high, and permeability is moderately slow or slow. Root penetration is restricted at a depth of 20 to 40 inches. The organic-matter content is medium to low. The response to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

These soils are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Corn and tobacco do well only under a high level of management. Suitable grasses and legumes are fescue, timothy, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIIe–4

Captina silt loam, 6 to 12 percent slopes, is the only soil in this unit.

This soil is moderately well drained and strongly acid to very strongly acid. It has a fragipan at a depth of about 20 inches that restricts root penetration. Available moisture capacity is moderate, and permeability is slow. The organic-matter content is medium to low. The response to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas. The water table is at a depth of 1½ to 2 feet during winter and spring.

This soil is suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Corn and tobacco do well only under a high level of management. Suitable grasses and legumes are orchardgrass, fescue, timothy, red clover, Ladino clover, and lespedeza. Alfalfa and small grain can be damaged by excess water in the root zone, mostly late in winter or early in spring.

If this soil is cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIIe–5

This unit consists of sloping soils of the Shelocta and Allegheny series on colluvial areas and terraces.

These soils are deep, well drained, and strongly acid to very strongly acid. The gravel in the surface layer of Allegheny gravelly loam makes this soil somewhat difficult to till. Available moisture capacity is high, and permeability is moderate. With the exception of Allegheny loam, the subsoil of these soils is 10 to 25 percent gravel. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is severe in cultivated areas.

These soils are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such grasses and legumes as orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IIIe–6

This unit consists of sloping soils of the Gilpin and Hartsells series.

These soils are moderately deep, well drained, and strongly acid to very strongly acid. Available moisture

capacity is moderate. The Gilpin soil has moderate permeability, but the Hartsells soil contains more sand and has moderately rapid permeability. The organic-matter content is medium to low. The response to lime and fertilizer is fair to good. The hazard of erosion is severe in cultivated areas.

These soils are slightly droughty, but are suited to most field crops, hay crops, and pasture plants commonly grown in the survey area. Suitable crops are corn, tobacco, small grain, and such grasses and legumes as orchardgrass, fescue, timothy, alfalfa, red clover, and lespedeza. Corn and tobacco grow well only under a high level of management.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good cover.

CAPABILITY UNIT IIIw–1

This unit consists of nearly level soils of the Bonnie and Melvin series on flood plains.

These soils are deep and poorly drained. The Bonnie soil is strongly acid, and the Melvin soil is slightly acid to neutral. In both soils available moisture capacity is high, and permeability is moderate. The water table is within a depth of 6 inches during winter and spring, and flooding is a hazard. Tile drains work well, but outlets are scarce in some areas. Unless adequate drainage is provided, the seasonal high water table restricts root penetration at a depth of about 1 foot for appreciable periods. The response to fertilizer is good if adequate drainage is provided.

If these soils are adequately drained, corn can be grown in the same area year after year. Suitable plants for undrained areas are fescue, Ladino clover, lespedeza, and reed canarygrass.

CAPABILITY UNIT IIIs–1

Bruno loamy fine sand is the only soil in this unit. It is predominantly nearly level and is on natural levees and riverbanks.

This soil is easy to till. It is somewhat excessively drained. In Estill County it is only slightly acid, but in Lee County it is strongly acid. Available moisture capacity is low to moderate, and permeability is rapid. This soil is droughty. The organic-matter content is low. The response to fertilizer is fair. Most areas of this soil are subject to frequent flooding, mostly late in winter or early in spring. On riverbanks where slopes are more than 12 percent, the hazard of erosion is severe.

This soil is suited to drought-resistant pasture plants and to early maturing crops and garden plants. It is better suited to fescue and sericea lespedeza than to other pasture plants.

CAPABILITY UNIT IVe–1

This unit consists of strongly sloping soils of the Allegheny, Shelocta, and Whitley series on uplands, colluvial areas, or stream terraces.

These soils are easy to till. They are deep, well drained, and strongly acid to very strongly acid. Available moisture capacity is high, and permeability is moderate. The organic-matter content is medium. The response to lime and fertilizer is good. The hazard of erosion is very severe in cultivated areas. The subsoil of the Shelocta soil is 10 to 25 percent gravel.

These soils are better suited to hay crops and pasture plants than to field crops. Suitable field crops are corn, tobacco, and small grain. They are suited to only occasional cultivation. Suitable grasses and legumes are orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IVe–2

Muse silt loam, 12 to 20 percent slopes, is the only soil in this unit.

This soil is easy to till. It is deep, well drained, and strongly acid. Available moisture capacity is high, and permeability is moderately slow. The subsoil is clayey. The organic-matter content is low. The response to lime and fertilizer is good. The hazard of erosion is very severe in cultivated areas.

This soil is suited to occasional use for corn, tobacco, small grain, or other crops that require cultivation. It is better suited to hay crops or pasture plants than to cultivated crops. Suitable grasses and legumes are orchardgrass, fescue, timothy, alfalfa, red clover, Ladino clover, and lespedeza.

If this soil is cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IVe–3

This unit consists of strongly sloping soils of the Gilpin and Latham series on uplands.

These soils are easy to till. They are strongly acid. Available moisture capacity is moderate. Root penetration is restricted at a depth of about 25 or 26 inches. The Gilpin soil is well drained and has moderate permeability and medium organic-matter content. The Latham soil is well drained or moderately well drained and has slow permeability, a clayey subsoil, and low organic-matter content. The response to lime and fertilizer is good. The hazard of erosion is very severe in cultivated areas.

These soils can be used occasionally for corn and small grain. They are better suited to hay crops and pasture plants than to cultivated crops. They are somewhat droughty. Suitable grasses and legumes are fescue, timothy, red clover, and lespedeza.

If these soils are cultivated, a cropping system and management are needed that slow down surface runoff and control erosion. It is important that pasture management provides a good plant cover.

CAPABILITY UNIT IVw–1

Purdy silt loam is the only soil in this unit. It is a nearly level soil on low stream terraces.

This soil is easy to till if it is not wet. It is strongly acid. The water table is within a depth of 6 inches during winter and spring, and flooding is a hazard in some

areas. Permeability is moderately slow. The feasibility of tile drains is questionable. The seasonal high water table restricts root penetration at a depth of about 1 foot for appreciable periods. The organic-matter content is low. The response to lime and fertilizer is fair to poor unless the soil is adequately drained.

This soil is suited to plants that tolerate long periods of wetness. Suitable plants are fescue, reed canarygrass, Ladino clover, and alsike cover. If adequate drainage is provided, corn can be grown in the same area year after year.

CAPABILITY UNIT VIe–1

This unit consists of moderately steep soils of the Gilpin, Allegheny, Latham, and Shelocta series on uplands, colluvial areas, and stream terraces.

These soils are easy to till. They are moderately deep or deep, well drained or moderately well drained to well drained, and strongly acid to very strongly acid. Available moisture capacity is high or moderate. Permeability is moderate except in the Latham soil, which has a clayey subsoil and slow permeability. The organic-matter content is medium to low. The response to lime and fertilizer is good.

These soils are not suited to cultivation, because the hazard of erosion is too severe. They are suited to hay crops, pasture plants (fig. 13), and trees. Suitable grasses and legumes are fescue, timothy, red clover, Korean lespedeza, and sericea lespedeza.

It is important to keep a good plant cover on these soils. Grass and legume mixtures should be selected that require the least frequent renovation. Periods of no grazing are needed to allow regrowth of pasture plants.

CAPABILITY UNIT VIe–2

Shrouts silty clay loam, 12 to 30 percent slopes, is the only soil in this unit. It is on uplands.

The clay content of the surface layer makes this soil somewhat difficult to till. It is somewhat excessively drained and neutral to mildly alkaline. Available moisture capacity is low, and permeability is slow. Root penetration is restricted at a depth of about 13 inches. The organic-matter content is low. The response to fertilizer is fair. The subsoil is clayey.

This soil is not suited to cultivation, because the hazard of erosion is too severe. It is suited to drought-resistant hay crops, pasture plants, and trees. Fescue and sericea lespedeza are well suited and long lived. Orchardgrass, red clover, and Korean lespedeza are fairly well suited, but are not long lived.

It is important to keep a good plant cover on this soil. Grass and legume mixtures should be selected that require the least frequent renovation. Periods of no grazing are needed to allow regrowth of pasture plants.

CAPABILITY UNIT VIe–3

Gilpin silt loam, 12 to 20 percent slopes, severely eroded, is the only soil in this unit. It is on uplands.

This soil is moderately deep, well drained, and strongly acid. The clay content of the surface layer makes this soil somewhat difficult to till. Available moisture capacity is moderate. Root penetration is restricted at a depth of about 22 inches, and the soil is somewhat droughty. The organic-matter content is very low. The response to lime and fertilizer is fair to poor.

This soil is not suited to cultivation, because the hazard of erosion is too severe. It is suited to hay crops, pasture plants, and trees. Fescue and sericea lespedeza are better suited than other pasture plants. Orchardgrass, timothy, red clover, and Korean lespedeza are fairly well suited but generally are short lived.

It is important to keep a good plant cover on these soils. Grass and legume mixtures should be selected that require the least frequent renovation. Periods of no grazing are needed to allow regrowth of pasture plants.

CAPABILITY UNIT VIs–1

This unit consists of sloping to strongly sloping Caneyville, Dekalb, and Ramsey soils and areas of Rock outcrop. These soils are on uplands.

Outcrops of bedrock, which make up 5 to 12 percent of the acreage, make tillage and the use of farm machinery difficult. These soils are strongly acid to very strongly acid. Available moisture capacity is moderate to very low, and the soils are droughty. Roots can penetrate to a depth of 15 to 30 inches. The Caneyville soil is clayey in the subsoil and has slow permeability. The Dekalb and Ramsey soils contain less clay and more sand and have moderately rapid or rapid permeability. Response to fertilizer is fair to poor.

These soils are too rocky for cultivation. They are suited to hay crops, pasture plants, and trees. Fescue and sericea lespedeza are better suited than other pasture plants. Orchardgrass, timothy, and Korean lespedeza are fairly well suited but generally are short lived.

It is important to keep a good plant cover on these soils. Grass and legume mixtures should be selected that require the least frequent renovation. Periods of no grazing are needed to allow regrowth of pasture plants.

CAPABILITY UNIT VIs–2

Colyer silt loam, 6 to 20 percent slopes, is the only soil in this unit. It is on uplands.

This soil is somewhat excessively drained, droughty, shallow, and very strongly acid. Available moisture capacity is low, and permeability is moderately slow. The high clay content below the 2-inch surface layer makes this soil somewhat difficult to till. Roots can penetrate to a depth of about 12 inches. The response to lime and fertilizer is fair to poor.

This soil is not suited to cultivation, because it is too shallow and the hazard of erosion is too severe. It is suited to drought-resistant hay crops, pasture plants, and trees. Fescue and sericea lespedeza are better suited than other pasture plants.

It is important to keep a good plant cover on this soil. Periods of no grazing are needed to allow regrowth of pasture plants.

CAPABILITY UNIT VIs–3

Alluvial land, steep, the only soil in this unit, is a droughty soil on banks of the Kentucky River.

In Lee County it is strongly acid, and in Estill County it is slightly acid. The surface layer is loamy fine sand or fine sandy loam and is underlain by alternating layers of loam or silt loam and loamy fine sand or fine sandy

Figure 13.—Area of Latham-Shelocta complex, 20 to 30 percent slopes, in Kentucky 31 fescue and Korean lespedeza pasture. Soils of this complex are in capability unit VIe–1.

loam. Available moisture capacity is low. Response to fertilizer is fair. Frequent flooding is a hazard in most areas.

This unit is not suited to cultivation, because it is droughty and the hazard of erosion is too severe. It is suited to drought-resistant hay crops, pasture plants and trees. Fescue and sericea lespedeza are well suited and long lived. Orchardgrass, timothy, and Korean lespedeza are fairly well suited but generally are short lived. It is important to keep a good plant cover on this soil.

CAPABILITY UNIT VIIe–1

This unit consists of moderately steep and steep Shelocta, Jefferson, and Latham soils on uplands.

These soils are deep and strongly acid to very strongly acid. All are well drained but Latham soil, which is moderately well drained to well drained. Available moisture capacity is high, and permeability is moderate except in Latham soil, which has moderate available moisture capacity and slow permeability. All are gravelly or stony.

These soils are not suited to cultivation, because they are too steep and the hazard of erosion is too severe. In most areas they are too steep for the use of modern farm machinery and are suited to trees or to limited grazing of hardy pasture plants. The moderately steep soils are suited to such pasture plants as fescue and sericea lespedeza. It is important to keep a good plant cover on these soils.

CAPABILITY UNIT VIIe–2

This unit consists of areas of Gullied land and of Shrouts clay, 12 to 40 percent slopes, severely eroded. Gullied land is so severely damaged that reclamation is not generally practical. Most areas are covered with bushes or are reverting to woods.

The Shrouts soil is very droughty and is difficult to till. It is neutral in reaction. Available moisture capacity is low, and permeability is slow. Root penetration is restricted at a depth of about 8 inches. The organic-matter content is very low. The response to fertilizer is poor.

This soil is not suited to cultivation, because it is too steep in most areas and the hazard of erosion is too severe. It is suited to limited grazing of drought-resistant pasture plants or to trees. Some areas are too steep for the use of modern farm machinery. Fescue and sericea lespedeza are better suited than other pasture plants. Maintaining a good plant cover is essential.

CAPABILITY UNIT VIIs–1

This unit consists of moderately steep Caneyville soils and strongly sloping to steep Brookside and Fairmount soils. All are on uplands.

These soils are 15 to 50 percent rock outcrops or stones, and some of these soils are so steep that the use of modern farm machinery is nearly impossible. The Caneyville soil is strongly acid, and the other soils are near neutral. Available moisture capacity is high to low, and permeability is moderately slow to slow. Root penetration is shallow to deep. These soils have a clayey subsoil.

These soils are too rocky and too steep to be used for cultivation. They are suited to trees or to limited grazing of hardy pasture plants. Most of the acreage is wooded. Maintaining pasture is very difficult. Fescue and sericea lespedeza are better suited than other pasture plants. It is important to keep a good plant cover on these soils.

CAPABILITY UNIT VIIs-2

Colyer shaly silt loam, 20 to 50 percent slopes, is the only soil in this unit. It is on uplands.

This soil is somewhat excessively drained, droughty, shallow, and very strongly acid. The high clay content in the plow layer makes this soil somewhat difficult to till. Available moisture capacity is low, and permeability is moderately slow. Roots can penetrate to a depth of about 12 inches. The response to lime and fertilizer is fair to poor.

This soil is not suited to cultivation, because it is too steep and too shallow. It is suited to trees or to limited grazing of drought-resistant pasture plants. In some areas it is too steep for the use of modern farm machinery. Fescue and sericea lespedeza are better suited than other pasture plants. It is important to keep a good plant cover on this soil.

Estimated Yields

Estimated average yields for the most common crops grown in Estill and Lee Counties under two levels of management are given in table 2. Yields for a medium level of management are shown in columns A; those for a high level of management are shown in columns B. Only the soils suitable for crops and pasture are listed.

Yields given are the averages that can be expected over several years. Yields in 1 year can be low because they are affected adversely by extremes of weather, insects, disease, or some other disaster. Yields in another year can be extremely high as a result of a combination of favorable factors.

Comparing yields in columns A with those in columns B shows the differences that can be expected under improved management. Yields for tobacco are for a high level of management because this level is nearly always used.

A high level of management consists of (1) planting suitable varieties of crops; (2) seeding at the proper rates, inoculating legumes, planting on suitable dates, and using efficient harvesting methods; (3) controlling weeds, insects, and plant disease; (4) applying fertilizer in amounts equal to or greater than the current recommendations of the University of Kentucky Agricultural Experiment Station or equal to or greater than the need shown by properly interpreted soil tests; (5) applying an adequate amount of lime; (6) providing drainage for naturally wet soils that are feasible to drain; (7) choosing a cropping system that helps to control erosion, maintain favorable soil structure and good tilth, and add to the supply of organic matter; (8) applying such erosion-control practices as contour tillage, terracing, contour stripcropping, and sod waterways; (9) using cover crops and crop residue to add to the supply of organic matter and to control erosion; (10) using all applicable pasture management practices; and (11) practicing minimum tillage, interseeding winter crops in row crops, and using other desirable management practices.

The high level of management described in the preceding paragraph is not the maximum level possible to achieve, but it is a level that is practical for many farmers if they choose to apply the proper practices. High level management results in the highest sustained production that is economically feasible.

The medium level of management is the fertilization treatment and management generally considered as the minimum that will prevent soil deterioration and yet produce enough returns for some profit.

The failure to adequately apply one or more of the listed items for high level of management can cause the production level to drop and can also permanently damage the soil. Inadequate drainage or only partial application of runoff- and erosion-control practices are examples of deficiencies that relate to medium level of management.

Woodland Uses of the Soils [3]

This section describes the woodland of Estill and Lee Counties, explains the woodland grouping of the soils, discusses potential of the soils in each group for producing wood crops, and describes the soil-related limitations that affect woodland management.

Hardwood forests originally covered the greater part of Estill and Lee Counties. At present, about 70 percent, or 116,480 acres, of Estill County is forested. Of this, the Forest Service manages 4,816 acres. About 80 percent, or 107,520 acres, of Lee County is forested, and the Forest Service manages 7,052 acres. The acreages under Forest Service management are in the Daniel Boone National Forest.

Upland oaks and hickory are currently predominant on the drier well-drained soils. Associated with them are chestnut oak, black oak, and scarlet oak. On the cooler aspects of slopes that generally face north and east, yellow-poplar, red oak, beech, sugar maple, black walnut, basswood, and white oak are predominant. Pin oak, sweetgum, red maple, elm, and ash grow principally on poorly drained soils of uplands, stream terraces, and bottom lands. Virginia pine, pitch pine, white pine, and shortleaf pine grow on all but the poorly drained soils in the survey area but are not numerous.

Products derived from the forests of these two counties include rough lumber, poles, posts, ties, barrel staves (fig. 14), and charcoal. Local markets provide outlets for these products. Additional local markets are needed, however, for low-grade hardwoods that can be used for small-dimension stock and pulpwood. Top-quality white oak

[3] Prepared in collaboration with WILLIAM M. MORRILL, woodland conservationist, Soil Conservation Service.

TABLE 2.—*Estimated average acre yields on arable soils under two levels of management*

[Yields in columns A are those to be expected under a medium level of management; those in columns B are those to be expected under a higher level of management. Dashes in columns indicate that the soil is unsuitable for the crop or that the crop is not commonly grown on the soil. Only the soils suitable for crops and pasture are listed]

Mapping unit	Corn		Tobacco	Wheat		Alfalfa and grass harvested for hay		Red clover and grass harvested for hay		Korean or Kobe lespedeza harvested for hay		Pasture (tall grasses and legumes)	
	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lb.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]
Allegheny loam, 2 to 6 percent slopes	65	110	2,900	25	40	3.0	4.0	1.7	2.8	1.0	1.8	150	230
Allegheny loam, 6 to 12 percent slopes	50	90	2,500	20	35	3.0	4.0	1.5	2.5	0.8	1.6	145	230
Allegheny loam, 12 to 20 percent slopes	40	70	2,250	15	30	2.5	3.5	1.0	2.0	------	------	110	210
Allegheny loam, 20 to 30 percent slopes	----	----	-------	----	----	------	------	------	------	------	------	100	175
Allegheny gravelly loam, 2 to 6 percent slopes	60	100	2,700	25	40	3.0	4.0	1.3	2.6	1.0	1.6	140	220
Allegheny gravelly loam, 6 to 12 percent slopes	45	85	2,400	20	35	3.0	4.0	1.3	2.6	0.8	1.5	140	225
Alluvial land, steep	----	----	-------	----	----	------	------	------	------	------	------	65	100
Bonnie silt loam	----	85	-------	----	----	------	------	------	2.8	1.0	2.0	110	200
Bruno loamy fine sand	40	65	1,850	15	25	1.8	2.5	1.0	1.8	0.7	1.1	80	130
Caneyville rocky silt loam, 6 to 20 percent slopes	----	----	-------	----	----	------	2.5	0.7	1.8	0.8	1.5	85	135
Caneyville very rocky silt loam, 20 to 30 percent slopes	----	----	-------	----	----	------	------	------	------	------	------	65	120
Captina silt loam, 2 to 6 percent slopes	60	90	2,500	20	40	2.0	3.0	1.7	2.6	1.0	1.7	110	190
Captina silt loam, 6 to 12 percent slopes	45	85	2,200	18	35	1.4	2.3	1.6	2.3	1.0	1.6	110	190
Clifty gravelly silt loam	65	95	2,700	25	35	3.5	4.8	2.0	3.0	1.3	2.0	150	240
Colyer silt loam, 6 to 20 percent slopes	----	----	-------	----	----	------	------	------	------	------	------	50	110
Cruze silt loam, 2 to 6 percent slopes	65	105	2,800	20	35	3.0	4.0	1.5	3.0	1.0	2.0	150	240
Cruze silt loam, 6 to 15 percent slopes	60	95	2,500	20	35	3.0	4.0	1.3	2.7	0.9	1.9	150	225
Cuba silt loam	75	120	3,000	30	45	3.5	5.0	2.0	3.2	1.3	2.0	200	285
Dekalb-Ramsey-Rock outcrop complex, 6 to 12 percent slopes:													
Dekalb soil	30	65	1,500	20	30	------	3.0	------	2.5	0.5	1.3	100	170
Ramsey soil	----	----	-------	----	----	------	------	------	------	------	------	50	115
Dekalb-Ramsey-Rock outcrop complex, 12 to 20 percent slopes:													
Dekalb soil	20	55	-------	15	25	------	2.5	------	2.0	------	------	70	145
Ramsey soil	----	----	-------	----	----	------	------	------	------	------	------	50	115
Elk silt loam, 0 to 2 percent slopes	70	120	3,100	30	45	3.5	5.0	2.0	3.0	1.3	2.0	180	260
Elk silt loam, 2 to 6 percent slopes	70	115	3,000	30	45	3.5	5.0	2.0	3.0	1.3	2.0	180	260
Elk silt loam, 6 to 12 percent slopes	55	95	2,600	25	40	3.0	4.5	1.7	2.7	1.1	1.8	150	240
Fairmount extremely rocky silty clay loam, 12 to 30 percent slopes	----	----	-------	----	----	------	------	------	------	------	------	30	[2]
Gilpin silt loam, 6 to 12 percent slopes	50	80	2,100	20	35	2.0	3.5	1.3	2.5	1.0	1.8	125	200
Gilpin silt loam, 12 to 20 percent slopes	35	60	1,500	15	25	1.5	3.0	1.0	2.0	------	------	100	170
Gilpin silt loam, 12 to 20 percent slopes, severely eroded	----	----	-------	----	----	------	------	------	------	------	------	60	120
Gilpin silt loam, 20 to 30 percent slopes	----	----	-------	----	----	------	------	------	------	------	------	80	150
Hartsells fine sandy loam, 6 to 12 percent slopes	40	85	2,200	20	35	------	3.5	1.0	2.0	0.7	1.5	100	200
Huntington silt loam	85	125	3,100	30	45	4.5	5.0	2.5	3.3	1.5	2.0	210	285
Lanton silt loam, 0 to 2 percent slopes	40	95	-------	----	----	------	------	------	2.5	0.5	2.0	120	220
Latham silt loam, 6 to 12 percent slopes	40	75	2,200	20	30	------	3.0	1.3	2.3	0.8	1.5	100	170
Latham silt loam, 12 to 20 percent slopes	30	60	2,100	15	25	------	2.5	1.0	2.0	------	------	80	150
Latham-Shelocta complex, 20 to 30 percent slopes:													
Latham soil	----	----	-------	----	----	------	------	------	------	------	------	60	130
Shelocta soil	----	----	-------	----	----	------	------	------	------	------	------	80	160
Lindside silt loam	80	120	2,900	25	40	3.5	5.0	2.0	3.0	1.5	2.0	170	250
Melvin silt loam	30	85	-------	----	----	------	------	------	2.2	------	1.7	100	190
Monongahela fine sandy loam, 2 to 6 percent slopes	50	90	2,500	20	35	------	2.8	1.2	2.6	1.0	1.7	100	200
Morehead silt loam	40	90	-------	----	----	------	------	------	2.5	0.5	1.7	110	210
Muse silt loam, 6 to 12 percent slopes	60	95	2,600	25	40	3.0	4.0	1.5	2.8	1.0	1.9	140	230
Muse silt loam, 12 to 20 percent slopes	45	75	2,200	20	35	2.0	3.5	1.0	2.4	------	------	100	200
Newark silt loam	70	100	2,600	----	30	------	------	1.8	3.0	1.2	2.0	150	235
Pope loam	80	110	2,800	30	45	3.5	4.5	1.8	3.0	1.2	2.0	165	250
Purdy silt loam	25	60	-------	----	----	------	------	------	2.0	------	1.5	90	180
Shelocta silt loam, 2 to 6 percent slopes	65	105	2,800	25	40	3.0	4.0	1.5	2.8	1.0	1.8	150	230

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields on arable soils under two levels of management*—Continued

Mapping unit	Corn		To-bacco	Wheat		Alfalfa and grass harvested for hay		Red clover and grass harvested for hay		Korean or Kobe lespedeza harvested for hay		Pasture (tall grasses and legumes)	
	A	B	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Lb.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days*[1]	*Cow-acre-days*[1]
Shelocta silt loam, 6 to 12 percent slopes	50	90	2,500	20	35	2.5	4.0	1.5	2.5	0.8	1.6	120	230
Shelocta silt loam, 12 to 20 percent slopes	40	70	2,200	15	30	2.0	3.5	1.0	2.0	------	------	100	210
Shrouts silty clay loam, 12 to 30 percent slopes	----	----	----	----	----	------	------	0.7	1.3	0.5	1.2	75	120
Stendal silt loam	65	105	2,500	----	30	------	------	1.8	3.0	1.2	2.0	150	235
Stendal gravelly silt loam	60	100	2,400	----	25	------	------	1.5	2.8	1.0	1.8	135	220
Trappist silt loam, 2 to 6 percent slopes	40	85	2,500	20	35	------	3.5	1.0	2.3	1.0	1.9	130	200
Trappist silt loam, 6 to 12 percent slopes	35	70	2,200	18	30	------	3.5	1.0	2.0	0.9	1.5	120	200
Whitley silt loam, 2 to 6 percent slopes	65	90	2,600	20	35	2.5	4.0	1.5	3.0	1.0	2.0	150	230
Whitley silt loam, 6 to 12 percent slopes	55	80	2,400	20	35	2.5	4.0	1.5	2.8	1.0	1.8	135	230
Whitley silt loam, 12 to 20 percent slopes	40	70	2,150	15	25	------	3.0	1.0	2.4	------	------	110	200
Woolper silty clay loam, 6 to 12 percent slopes	70	100	2,600	20	35	3.5	4.7	2.0	3.0	1.5	2.0	170	250

[1] Cow-acre-days is the number of days one animal unit can be grazed during a single grazing season without injury to the sod.
[2] A high level of management ordinarily is not justified.

and black walnut logs are generally marketed in Winchester, Louisville, or larger out-of-State cities for processing into veneer or high-grade lumber.

Many soils in Estill and Lee Counties have a potential for producing more abundant and better quality wood products. In order to realize this potential, better management of woodland is generally necessary. Such management should relate to the characteristics of the soils. Among the most important soil characteristics that affect the growth of trees are moisture-supplying capacity, depth of root zone, aeration, thickness and texture of the surface and subsurface layers, drainage, and depth to a hardpan or other restrictive layer.

In these two counties, the forests are adequately protected from fire.

Woodland Grouping

The soils of Estill and Lee Counties have been placed in 10 woodland groups. Each group is made up of soils that are suitable for similar kinds of wood crops, that need similar management, and that are about equal in productivity.

The factors considered in placing each soil in a woodland group are (1) potential productivity for several kinds of trees that grow in the survey area, (2) species to favor in managing existing woodland, (3) species preferred for planting, and (4) critical soil-related hazards and limitations to be considered in woodland management with respect to erosion, use of equipment, plant competition, and seedling mortality.

Potential productivity is expressed as site index, or the expected height in feet that the dominant trees in a stand will attain on a specified kind of soil or group of soils at a stated age. For most species the index is based on height at the age of 50 years. The site index for species in each woodland group is expressed as a range. Thus, the site index for lowland oaks on soils in woodland group 1 is 75–85.

Many trees in Estill and Lee Counties and in adjacent areas were measured in the process of gathering data from which to determine site indexes for wood crops. As nearly as possible, trees were measured and soils described in well-stocked, even-aged, essentially unmanaged woodland that had not been adversely affected by fire, insects, or disease and had not been grazed to a damaging extent.

Tree measurements of height and age were converted to site index by use of published site index curves (*3*, *4*, *5*, *7*, *9*, *12*, *15*). The curves used for determining site index of eastern redcedar are unpublished but are the result of measurements in 271 study plots in the Tennessee Valley.

Site index can be converted to a volumetric prediction of growth and yield, which can be shown in such wood measurements as board feet per acre.

Predictions of average annual growth per acre, in board feet International ¼-inch scale, are based on published information (*8*, *9*, *11*, *12*, *13*) and on tree-growth data obtained from soil-site evaluations conducted by the Soil Conservation Service. Annual growth estimates are to age 60 for oak and yellow-poplar and to age 50 for other species of trees.

Erosion hazard is the degree of potential soil erosion that may occur following cutting operations and where the soil is exposed along roads, skid trails, fire lanes, and landing areas. It is assumed that the woodland is well managed and is protected from fire and grazing. Soil characteristics considered in rating the erosion hazard are slope, rate of infiltration, permeability of the subsoil, water storage capacity, and resistance to detachment of soil particles by rainfall and runoff.

Relative ratings of the erosion hazard have the following meanings: *Slight*, no special measures are needed;

Figure 14.—Bolts for barrel staves split from white oak grown on Shelocta gravelly silt loam, 20 to 60 percent slopes.

moderate, some attention needs to be given to the prevention of soil erosion; and *severe*, intensive erosion-control measures are needed.

Wooded soils can be protected from erosion by carefully locating, constructing, and maintaining roads, trails, fire lanes, and landings.

The limitations on use of equipment are influenced by slope, drainage, soil texture, stoniness, and rockiness. These features can restrict the use of conventional wheel or track-type equipment for harvesting and planting wood crops, constructing roads, controlling fire, and controlling unwanted vegetation. Topographic conditions or differences in soils may necessitate using different kinds of equipment and methods of operation or varying the season when equipment is used. The equipment limitation is *slight* where slopes are 12 percent or less and farm machinery can be operated efficiently without construction and maintenance of permanent roads and truck trails. The limitation is *moderate* where slopes are 12 to 30 percent or if use of ordinary farm machinery is limited, track-type equipment is necessary for efficient harvesting, or soil wetness prevents the use of logging vehicles for a period of 2 to 6 months. The limitation is *severe* where slopes are more than 30 percent or if track-type equipment is not adequate for harvesting and power winches and other special equipment are needed, or wetness prevents the use of vehicles for a period of 6 months or more.

Unwanted trees, vines, shrubs, and other plants invade a site where openings are made in the crown canopy. Competition from such undesirable plants hinders the establishment and normal development of desirable seedlings, whether they occur naturally or are planted. Plant competition is *slight* if unwanted plants do not prevent adequate natural regeneration, interfere with early growth, or restrict the normal development of planted stock. Competition is *moderate* if unwanted plants delay establishment and hinder growth of either planted stock or naturally regenerated seedlings or if they retard the eventful development of a fully stocked stand. Competition is *severe* if unwanted plants prevent adequate restocking, either by natural regeneration or by planting, without intensive site preparation or special maintenance practices.

Even though plant competition is not a factor, some loss of seedlings is expected if soil characteristics or topographic features are unfavorable. Seedling mortality is *slight* if the expected loss is not more than 25 percent of the number needed to provide optimum stocking. Mortality is *moderate* if the expected loss is between 25 and 50 percent; it is *severe* if the expected loss is more than 50 percent. If the rating is *moderate* or *severe*, replanting

is likely to be needed to insure a fully stocked stand, and special preparation of the seedbed and special planting techniques are often necessary.

Descriptions of Woodland Groups

The discussion of each woodland group contains a brief description of the soils in the group and provides information on site index, annual growth, species to favor in management, and soil-related hazards to management. Some moderately steep and steep soils are placed in more than one woodland group on the basis of differences in aspect. On these soils, higher productivity has been measured on north- and east-facing slopes than on south- and west-facing slopes.

WOODLAND GROUP 1

This group consists of the nearly level to strongly sloping Whitley, Elk, Hartsells, Shelocta, and Allegheny soils. These soils are moderately deep and deep, well drained, and loamy.

The site index range for trees growing on these soils is 75 to 85 feet for oak, 95 to 105 for yellow-poplar, 70 to 80 for shortleaf pine, and 75 to 85 for Virginia pine.

The average annual growth per acre is approximately 290 board feet for oak, 550 board feet for yellow-poplar, 670 board feet for shortleaf pine, and 590 board feet for Virginia pine. A high intensity of management is justified.

The species to be favored in managing existing stands are yellow-poplar, black walnut, white pine, white oak, white ash, sugar maple, black cherry, basswood, black oak, and red oak.

The species to be favored in planting are yellow-poplar, black walnut, black locust, northern red oak, loblolly pine, white pine, white ash, shortleaf pine, and Virginia pine.

The erosion hazard is slight where slopes are 12 percent or less and moderate where slopes are more than 12 percent and range up to 20 percent. The location, construction, and maintenance of roads and skid trails are important considerations in areas where slopes are more than 12 percent.

The equipment limitation is moderate where slopes range from 12 to 20 percent. In places, track-type equipment or winches are required for efficient harvest of wood crops.

Plant competition is moderate to severe because the moisture available to plants is most favorable during the growing season. In places, competition from shade-tolerant trees of low quality in sawlog stands interferes with establishment and growth of desirable trees after logs are harvested. One or more weedings are generally necessary to control competing vegetation. The weeding requirements involved normally make tree planting or interplanting unfeasible.

Seedling mortality is slight.

WOODLAND GROUP 2

This group consists of the sloping to strongly sloping Dekalb, Gilpin, and Ramsey soils and moderately steep Gilpin soils on south- and west-facing slopes. These soils are shallow to moderately deep. Some areas are extremely rocky.

The site index range for trees growing on these soils is 65 to 75 feet for oak, 80 to 90 for yellow-poplar, 65 to 75 for shortleaf pine, and 65 to 75 for Virginia pine.

The average annual growth per acre is approximately 200 board feet for oak, 390 board feet for yellow-poplar, 500 board feet for Virginia pine, and 600 board feet for shortleaf pine. A moderate intensity of management is justified.

The species to be favored in managing existing stands are yellow-poplar, white oak, scarlet oak, chestnut oak, Virginia pine, and shortleaf pine.

The species to be favored in planting are white pine, yellow-poplar, shortleaf pine, and Virginia pine.

The erosion hazard is slight to moderate. The location, construction, and maintenance of roads and skid trails are important considerations in areas where slopes are more than 12 percent.

The equipment limitation is slight where slopes are less than 12 percent and moderate where slopes are more than 12 percent. In places, track-type equipment is required for efficient harvest of wood crops on steeper soils.

Plant competition is slight for hardwoods and moderate for conifers.

Seedling mortality is slight to moderate.

WOODLAND GROUP 3

This group consists of the gently sloping to strongly sloping Latham, Muse, Trappist, and Woolper soils; the sloping to moderately steep, very rocky Caneyville soils; and the steep Brookside soils on south- and west-facing slopes. These soils are well drained and have a clayey subsoil.

The site index range for trees growing on these soils is 65 to 75 feet for oak, 85 to 95 for yellow-poplar, 65 to 75 for shortleaf pine, 65 to 75 for Virginia pine, and 35 to 45 for eastern redcedar.

The average annual growth per acre is approximately 200 board feet for oak, 450 board feet for yellow-poplar, 600 board feet for shortleaf pine, and 500 board feet for Virginia pine. A medium intensity of management is justified.

The species to be favored in managing existing stands are yellow-poplar, scarlet oak, white oak, black oak, shortleaf pine, Virginia pine, and redcedar.

The species to be favored in planting are shortleaf pine, white pine, redcedar, and yellow-poplar.

The erosion hazard is moderate where slopes are 6 to 12 percent and severe where slopes are more than 12 percent. The location, construction, and maintenance of roads and skid trails are important considerations in areas where slopes are more than 12 percent.

The equipment limitation is slight on silt loams that have slopes of 6 to 12 percent. It is moderate on silt loams that have slopes of more than 12 percent and on very rocky loams that have slopes ranging from 6 to 30 percent. In places, track-type equipment and power winches are required for efficient harvest of wood crops.

Plant competition is slight for hardwoods and moderate for conifers.

Seedling mortality is moderate on south- or west-facing slopes of more than 15 percent; otherwise, it is slight.

WOODLAND GROUP 4

This group consists of the gently sloping to sloping Captina, Cruze, and Monogahela soils. These soils are moderately well drained. The Captina and Monongahela soils are loamy and have a fragipan. The Cruze soils have a clayey subsoil.

The site index range for trees growing on these soils is 65 to 75 feet for oak, 85 to 95 for yellow-poplar, 65 to 75 for shortleaf pine, and 65 to 75 for Virginia pine.

The average annual growth per acre is approximately 200 board feet for oak, 450 board feet for yellow-poplar, 600 board feet for shortleaf pine, and 490 board feet for Virginia pine. A medium intensity of management is justified.

The species to be favored in managing existing stands are yellow-poplar, white oak, white pine, red oak, Virginia pine, and loblolly pine.

The species to be favored in planting are white pine, loblolly pine, Virginia pine, and yellow-poplar.

The erosion hazard is slight where slopes are less than 6 percent, moderate where slopes are 6 to 12 percent, and severe where slopes are more than 12 percent. The location, construction, and maintenance of roads and skid trails are important considerations in areas where slopes are more than 12 percent.

The equipment limitation is moderate. In places, track-type equipment is required for harvest of wood crops.

Plant competition is slight for hardwoods and moderate for conifers.

Seedling mortality is slight.

WOODLAND GROUP 5

This group consists of the sloping to steep Colyer, Fairmount, and Shrouts soils and severely eroded Gilpin soils. These soils are shallow to moderately deep and droughty. The steep Colyer soils are on north- and east-facing slopes. Some areas are extremely rocky.

The site index range for trees growing on these soils is 55 to 65 feet for oak, 55 to 65 for Virginia pine, and 40 to 50 for redcedar.

The average annual growth per acre is approximately 120 board feet for oak and 410 board feet for Virginia pine. A medium intensity of management is justified.

The species to be favored in managing existing stands are white oak, black oak, scarlet oak, Virginia pine, and redcedar.

The species to be favored in planting are redcedar, Virginia pine, and Scotch pine.

The erosion hazard is moderate where slopes are 6 to 12 percent and severe where slopes are more than 12 percent. The location, construction, and maintenance of roads and skid trails are important considerations in areas where slopes are more than 12 percent.

The equipment limitation is moderate where slopes are 6 to 12 percent and severe where slopes are 12 to 60 percent. In places, track-type equipment or winches are required for efficient harvest of timber where slopes are more than 30 percent.

Plant competition is slight for hardwoods and conifers.

Seedling mortality is moderate to severe, depending on the severity of drought periods of 1 week or more in the early part of some growing seasons. These dry periods can cause moderate to severe losses to newly regenerated or planted trees.

WOODLAND GROUP 6

This group consists of the moderately steep to steep Colyer soils on south- and west-facing slopes; Gullied land; and severely eroded, strongly sloping to steep, clayey Shrouts soils. These soils are shallow and very droughty.

The site index range for trees growing on these soils is 45 to 55 feet for oak, 45 to 55 for Virginia pine, and 35 to 45 for redcedar.

The average annual growth per acre is approximately 75 board feet for oak and 330 board feet for Virginia pine. A low intensity of management is justified.

The species to be favored in managing existing stands are eastern redcedar, post oak, black oak, and Virginia pine.

The species to be favored in planting are eastern redcedar and Virginia pine.

The erosion hazard is severe.

Plant competition is slight.

Droughtiness makes seedling mortality severe.

WOODLAND GROUP 7

This group consists of the moderately steep and steep Allegheny, Shelocta, Jefferson, and Latham soils and the steep Brookside and moderately steep Gilpin soils on north- and east-facing slopes. These soils are moderately deep and deep and well drained.

The site index range for trees growing on these soils is 75 to 85 feet for oak, 85 to 95 for yellow-poplar, 75 to 85 for Virginia pine, and 70 to 80 for shortleaf pine.

The average annual growth per acre is approximately 290 board feet for oak, 440 board feet for yellow-poplar, 590 board feet for Virginia pine, and 670 board feet for shortleaf pine. A high intensity of management is justified.

The species to be favored in managing existing stands are white oak, yellow-poplar, black walnut, white pine, sugar maple, red oak, black oak, and basswood.

The species to be favored in planting are yellow-poplar, black walnut, black locust, northern red oak, white pine, shortleaf pine, and white ash (fig. 15).

The erosion hazard is severe. The location, construction, and maintenance of roads and skid trails are important considerations in areas where slopes are more than 12 percent.

The equipment limitation is slight where slopes are generally less than 30 percent and severe where slopes are steeper. In places, track-type equipment or winches are required for efficient harvest of wood crops.

Plant competition is moderate for hardwoods and severe for conifers.

Seedling mortality is slight.

WOODLAND GROUP 8

This group consists of the nearly level Bruno, Clifty, Cuba, Huntington, and Pope soils on bottom lands and Alluvial land, steep. These soils are deep, well drained, and loamy except for Bruno soils, which are sandy.

The site index range for trees growing on these soils is 85 plus for oak, 95 plus for yellow-poplar, 85 plus for

Figure 15.—**White pine and shortleaf pine interplanted in a stand of low-grade hardwoods on Latham-Shelocta complex, 30 to 60 percent slopes.**

shortleaf pine, 85 plus for Virginia pine, and 95 plus for white pine.

The average annual growth per acre is 350 plus board feet for oak, 500 plus board feet for yellow-poplar, 800 plus board feet for shortleaf pine, and 650 plus board feet for Virginia pine. A high intensity of management is justified.

The species to be favored in managing existing stands are yellow-poplar, black walnut, white oak, red oak, white pine, white ash, sugar maple, black cherry, shortleaf pine, and Virginia pine.

The species to be favored in planting are yellow-poplar, white pine, black walnut, shortleaf pine, loblolly pine, white ash, and red oak.

The erosion hazard, equipment limitation, and seedling mortality are slight.

Plant competition is moderate for hardwoods and severe for conifers. Competition from shade-tolerant trees of low quality in sawlog stands can interfere with establishment and growth of desirable trees after logs are harvested. One or more weedings generally are necessary to control undesirable competitive vegetation. The weeding requirements involved normally make interplanting unfeasible.

WOODLAND GROUP 9

This group consists of the nearly level Lindside, Morehead, Newark, and Stendal soils on bottom lands. These soils are deep and somewhat poorly drained to moderately well drained. Most areas are subject to flooding.

The site index range for trees grown on these soils is 85 plus for oak, 95 plus for yellow-poplar, 90 to 100 for pin oak, and 95 plus for sweetgum.

The average annual growth per acre is 350 plus board feet for upland oak, 450 board feet for pin oak, 500 plus board feet for yellow-poplar, and 500 plus board feet for sweetgum. A high intensity of management is justified.

The species to be favored in managing existing stands are black walnut, yellow-poplar, white oak, pin oak, white pine, loblolly pine, sweetgum, black oak, and red maple.

The species to be favored in planting are yellow-poplar, black walnut, loblolly pine, white pine, red oak, and sweetgum.

The erosion hazard and seedling mortality are slight.

The equipment limitation is moderate because flooding prohibits its use during wet periods.

Plant competition is generally moderate for hardwoods and severe for conifers. Competition from shade-tolerant

trees and shrubs of low quality can interfere with establishment and growth of desirable trees after logs are harvested. One or more weedings generally are necessary to control undesirable competitive vegetation.

WOODLAND GROUP 10

This group consists of the nearly level Bonnie, Lanton, Melvin, and Purdy soils on bottom lands. These soils are deep, poorly drained, and subject to flooding. The water table may be high for as long as 6 months out of the year.

The site index range for trees grown on these soils is 95 plus for pin oak, 95 plus for cottonwood, and 95 plus for sweetgum.

The average annual growth per acre is approximately 450 plus board feet for oak, 550 plus board feet for cottonwood, and 500 plus board feet for sweetgum. A high intensity of management is justified.

The species to be favored in managing existing stands are pin oak, swamp white oak, sweetgum, red maple, and sycamore.

The species to be favored in planting are sweetgum and cottonwood.

The erosion hazard is slight.

The equipment limitation is severe. These soils are not readily accessible during wet periods, and the use of equipment during such periods is likely to severely damage tree roots and soil structure. Generally, the soils are too wet in winter for use of logging equipment.

Plant competition is severe. Intensive weeding or other preparation of the site is required if desirable trees are to regenerate naturally.

Seedling mortality is severe. Hardwoods and pines are susceptible to damage from excessive moisture. During spring, tree planting is not feasible until flooding has ceased.

Use of the Soils for Wildlife

This section discusses the kinds of wildlife in the survey area, explains the relationship between management of wildlife and soils, and provides definitions of the suitability ratings used to evaluate the soils for elements of wildlife habitat, definitions of the various wildlife elements, and definitions of the three kinds of wildlife. It also provides, in table 3, suitability ratings of the soils for eight elements of wildlife habitat and three kinds of wildlife. The suitability ratings are based on soil-related limitations. Specific soil characteristics are described in the section "Descriptions of the Soils."

The principal kinds of wildlife in Estill and Lee Counties are the cottontail rabbit, gray squirrel, raccoon, opossum, gray fox, muskrat, bobwhite quail, and ruffed grouse.

In the streams of the counties is the usual variety of warm-water game fish, pan fish, and rough fish commonly found throughout the State. Examples of these are largemouth bass, bluegill, and bullhead, respectively. Most farm ponds have been stocked with largemouth bass and bluegill.

Wildlife populations vary from year to year, but rabbits, gray squirrels, raccoons, opossums, gray foxes, muskrats, bobwhite quail, and ruffed grouse are common most of the time. Other mammals and birds that are present in or visit Estill and Lee Counties occasionally are fox squirrels, white-tailed deer, skunks, red foxes, mink, mourning doves, ducks, geese, and wild turkeys.

Game fish and pan fish are common in the streams of Estill and Lee Counties, but they are outnumbered by rough fish, which are abundant. Since game fish and pan fish are the only species generally stocked in ponds and lakes, few rough fish are found in those waters.

Suitability of the Soils for Wildlife

Successful management of wildlife on any tract of land requires that food, cover, and water be available in a suitable combination. Lack of any one of these necessities, unfavorable balance between them, or inadequate distribution of them can severely limit or account for the absence of desired wildlife species. Soil information provides a valuable tool in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is managed by planting suitable vegetation (fig. 16); manipulating existing vegetation in order to bring about natural establishment, increase, or improvement of desired plants; or combinations of such measures. The influence of a soil on growth is known for many kinds of plants and can be inferred for others from a knowledge about the characteristics and behavior of the soil. In addition, water areas can be created or natural ones improved as wildlife habitat. Soil information is useful for these purposes.

Soil interpretations for wildlife habitat serve a variety of purposes. They are an aid in selecting the more suitable sites for various kinds of habitat management. They serve as indicators of the level of management intensity needed to achieve satisfactory results. They also serve as a means of showing why it may not generally be feasible to manage a particular area for a given kind of wildlife.

These interpretations also may serve in broad-scale planning of wildlife management areas, parks, and nature areas or in acquiring wildlife lands. By means of map overlay, individual habitat element suitabilities or groupings can be made.

The soil areas shown on the soil survey maps are rated without regard to positional relationships with adjoining delineated areas. The size, shape, or location of the outlined areas does not affect the rating. Certain influences on habitat, such as elevation and aspect, must be appraised at the site selected for habitat development.

Special attention is directed to the rating in table 3 of coniferous woody plant habitat. There is considerable evidence to show that, where the crown canopy is open or is slow to close, a coniferous habitat harbors larger numbers and varieties of wildlife than where the crowns of coniferous plants close to exclude light. Soil properties, therefore, that tend to promote rapid growth and canopy closure of coniferous plants are considered as limitations to the use and management of a soil for wildlife habitat.

In general, soil conditions that favor quick establishment and rapid growth of conifers require more intensive management to achieve satisfactory results for long-term use by wildlife. Therefore, soils that are poorly suited to

coniferous woody plants can provide easy establishment and temporary, or short-term, value for wildlife habitat.

Suitability ratings have meanings as follows: *Well suited* means that soil limitations are negligible in the management of the designated habitat element. Generally, the intensity of management required for the creation, improvement, or maintenance of the habitat element is low and satisfactory results are well assured. *Suited* means that soil limitations moderately affect the management of the designated habitat element. Fairly frequent attention and a moderate intensity of effort are required to achieve satisfactory results. *Poorly suited* means that soil limitations are severe. The creation, improvement, or maintenance of the designated habitat element is difficult, is likely to be expensive, and requires intensive effort to attain satisfactory results. *Unsuited* means that soil limitations are so extreme that it is highly impractical, if not impossible, to manage the designated habitat element on the stated soil.

The eight elements of wildlife habitat shown in table 3 are defined as follows:

Grain and seed crops.—Farm grains or seed-producing annuals planted to produce food for wildlife. Examples are corn, sorghum, wheat, oats, millet, buckwheat, soybeans, and sunflowers.

Grasses and legumes.—Domestic perennial grasses and herbaceous legumes that are established by planting and furnish wildlife food and cover. Examples are fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and panicgrass.

Wild herbaceous upland plants.—Native or introduced perennial grasses and forbs (weeds) that provide food and cover principally to upland forms of wildlife and that are established mainly through natural processes. Examples are bluestem, indiangrass, wheatgrass, wild ryegrass, oatgrass, pokeweed, strawberries, lespedeza, beggarweed, wild beans, nightshade, goldenrod, and dandelion.

Hardwood woody plants.—Nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs (browse), or foliage used extensively as food by wildlife and that commonly are established through natural processes but also may be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grape, honeysuckle, blueberries, brier, greenbrier, autumn-olive, and multiflora rose.

Coniferous woody plants.—Cone-bearing trees and shrubs that are important to wildlife mainly as cover but also may furnish food in the form of browse, seeds, or fruitlike cones. Plants commonly are established through natural processes but also may be planted. As explained in the introductory paragraphs, soils well suited to coniferous wildlife habitat are those in which plants grow slowly and closure of the canopy is delayed. Examples of plant species are pine, hemlock, and redcedar.

Wetland food and cover plants.—Annual and perennial, wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover extensively and dominantly used by wetland wildlife. Examples are smartweed, wild millet, bulrush, spike sedge, rushes, sedges, burreeds, wild rice, rice cutgrass, mannagrass, and cattails.

Shallow-water developments.—Impoundments or excavations for control of water, generally not exceeding 6 feet in depth. Examples are low dikes and levees, shallow dugouts, level ditches, and devices for water-level control in marshy drainageways or channels.

Excavated ponds.—Dug-out water areas or combinations of dug-out areas and low dikes (dammed areas) that have water of suitable quality, of suitable depth, and in ample supply for production of fish or wildlife. Examples are ponds built on nearly level land, of at least one-fourth acre surface area, having an average depth of 6 feet over at least one-fourth the area, and having a dependably high water table or other source of water.

The kinds of wildlife shown in table 3 are defined as follows:

Openland wildlife.—Birds and mammals that normally make their homes in croplands, pastures, meadows, lawns, and areas overgrown with grasses, herbs, and shrubby plants. Examples are quail, meadowlarks, field sparrows, doves, cottontail rabbit, red fox, and woodchuck.

Woodland wildlife.—Birds and mammals that normally make their homes in areas wooded with hardwood trees and shrubs, coniferous trees and shrubs, or mixtures of such plants. Examples are ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, gray squirrel, gray fox, white-tailed deer, raccoon, and wild turkey.

Wetland wildlife.—Birds and mammals that normally make their homes in wet areas, such as ponds, marshes, and swamps. Examples are ducks, geese, herons, shore birds, mink, muskrat, and beaver.

Engineering Uses of the Soils[4]

This section is useful to those who need information about soils used as structural material or as foundation material upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, shear strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain-size distribution, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commermercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.

[4] Prepared with the collaboration of R. L. QUIGGINS, area engineer, Soil Conservation Service.

TABLE 3.—*Suitability of soils for elements*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil, which may listed in the first

Soil series and map symbols	Wildlife habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Allegheny:				
AgB, AgC	Suited	Well suited	Well suited	Well suited
AgD, AhB	Poorly suited	Suited	Well suited	Well suited
AgE, AhC	Unsuited	Suited	Well suited	Well suited
Alluvial land, steep: AlF	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Bonnie: Bn	Poorly suited	Suited	Suited	Well suited
Brookside: BoF	Unsuited	Poorly suited or unsuited.	Well suited	Well suited
Bruno: Bu	Poorly suited	Suited	Suited	Suited
Caneyville:				
CaD	Poorly suited	Suited	Well suited	Well suited
CeE	Unsuited	Poorly suited	Suited	Suited
Captina: CmB, CmC	Suited	Well suited	Well suited	Well suited
Clifty: Cn	Suited	Well suited	Well suited	Well suited
Colyer:				
CoD	Unsuited	Poorly suited	Suited	Poorly suited
CrF	Unsuited	Poorly suited	Poorly suited	Poorly suited
Cruze: CsB, CsC	Suited	Well suited	Well suited	Well suited
Cuba: Cu	Suited	Well suited	Well suited	Well suited
*Dekalb:				
DrC	Suited	Suited	Suited	Suited
DrD	Poorly suited	Suited	Suited	Suited
For Ramsey part of these units, see Ramsey series. Rock outcrop part is not evaluated.				
Elk:				
ElA	Well suited	Well suited	Well suited	Well suited
ElB, ElC	Suited	Well suited	Well suited	Well suited
Fairmount: FeE, FeF	Unsuited	Poorly suited	Suited	Suited
Gilpin:				
GlC	Suited	Well suited	Well suited	Well suited
GlD	Poorly suited	Suited	Well suited	Well suited
GlD3, GlE	Unsuited	Suited	Well suited	Well suited
Gullied land: Gu	Unsuited	Unsuited	Unsuited	Poorly suited
Hartsells: HeC	Suited	Well suited	Well suited	Well suited
Huntington: Hu	Suited	Well suited	Well suited	Well suited
Lanton: LaA	Unsuited	Poorly suited	Poorly suited	Well suited
*Latham:				
LbC	Suited	Well suited	Well suited	Well suited
LbD	Poorly suited	Suited	Well suited	Well suited
LcE, LcF	Unsuited	Poorly suited or unsuited.	Well suited	Well suited
For Shelocta part of LcE and LcF, see Shelocta series.				
Lindside: Ld	Suited	Well suited	Well suited	Well suited
Melvin: Me	Poorly suited	Suited	Suited	Well suited
Monongahela: MoB	Suited	Well suited	Well suited	Well suited
Morehead: Mr	Suited	Well suited	Well suited	Well suited
Muse:				
MsC	Suited	Well suited	Well suited	Well suited
MsD	Poorly suited	Suited	Well suited	Well suited
Newark: Ne	Suited	Well suited	Well suited	Well suited
Pope: Po	Suited	Well suited	Well suited	Well suited
Purdy: Pu	Poorly suited	Suited	Suited	Well suited
Ramsey	Poorly suited	Poorly suited	Suited	Suited
Mapped only with Dekalb soils.				
Shelocta:				
SeB, SeC	Suited	Well suited	Well suited	Well suited
SeD	Poorly suited	Suited	Well suited	Well suited
SlF, SoF	Unsuited	Poorly suited	Well suited	Well suited
Shrouts: SrE, SsE3	Unsuited	Poorly suited	Suited	Suited
Stendal: St, Su	Suited	Well suited	Well suited	Well suited
Trappist: TrB, TrC	Suited	Well suited	Well suited	Well suited
Whitley:				
WhB, WhC	Suited	Well suited	Well suited	Well suited
WhD	Poorly suited	Suited	Well suited	Well suited
Woolper: WoC	Suited	Well suited	Well suited	Well suited

of wildlife habitat and kinds of wildlife

have different suitabilities for wildlife. For this reason, the reader should follow carefully the instructions for referring to another series column of this table]

Wildlife habitat elements—Continued				Kinds of wildlife		
Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Poorly suited.
Suited	Suited	Suited	Unsuited	Suited	Well suited	Suited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Well suited	Unsuited	Unsuited	Unsuited	Unsuited	Poorly suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Unsuited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Well suited	Well suited	Suited	Poorly suited	Well suited	Well suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Suited	Suited	Suited	Unsuited	Suited	Well suited	Suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Poorly suited	Suited	Suited	Well suited	Well suited	Suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Suited	Poorly suited	Well suited	Well suited	Suited	Well suited	Suited.
Suited	Suited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Suited	Unsuited	Unsuited	Unsuited	Poorly suited	Suited	Unsuited.
Poorly suited	Poorly suited	Poorly suited	Poorly suited	Well suited	Well suited	Poorly suited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Poorly suited	Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.

Figure 16.—Grain sorghum and Korean lespedeza in a small cleared area of Gilpin silt loam, 6 to 12 percent slopes, provide food for wildlife.

5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 4 and 5, which show, respectively, several estimated soil properties significant to engineering and the interpretations for various engineering uses.

The information in these tables, along with the soil map and other parts of this publication, can be used to make interpretations and it also can be used to make other useful maps.

This information, however, does not eliminate the need for further investigations at sites selected for engineering works, especially works that involve heavy loads or require excavations to depths greater than those shown in the tables, generally depths greater than 5 feet. Also, inspection of sites, especially small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some terms used by soil scientists have different meanings in soil science than they have in engineering. The Glossary defines many such terms.

Engineering Soil Classification Systems

The two systems most commonly used in classifying soils for engineering are the Unified system (*10*, *19*) used by the Soil Conservation Service engineers, the Department of Defense, and other agencies, and the AASHO system (*1*) adopted by the American Association of State Highway Officials.

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML-CL.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups that range from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, or the best soils for road fill; at the other extreme, in group A-7, are clay soils that have low strength when wet and are the poorest soils for road fill. Where laboratory data are available to justify a further breakdown, the A-1, A-2, and A-7 groups are divided as follows: A-1-a, A-1-b; A-2-4, A-2-5, A-2-6, A-2-7; and A-7-5 and A-7-6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The estimated AASHO classification, without group index numbers, is given in table 4 for all soils mapped in the survey area.

Soil Properties Significant in Engineering

Several estimated soil properties significant to engineering are given in table 4. These estimates are made for representative soil profiles, by horizons sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 4.

Depth to bedrock is distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Soil texture is described in table 4 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary at the back of this survey.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 4 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. Terms used to describe soil reaction are given in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content, that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

Engineering Interpretations

The interpretations in table 5 are based on estimates of the engineering properties of soils shown in table 4, on test data for soils in nearby or adjoining areas, and on the experience of engineers and soil scientists with the soils of Estill and Lee Counties. In table 5, soil suitability is rated by the terms *good*, *fair*, and *poor* for such uses as topsoil and road fill. These and other columns in table 5 are explained in the following paragraphs.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, for example, in preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that results at the area from which topsoil is taken.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage, and the relative ease of excavating the material at borrow areas.

Highway and road location is influenced by such features of the undisturbed soil as depth to bedrock, depth to the water table, presence of stones and boulders, hazard of flooding, stability of slopes, plasticity of soil material, potential frost action, and topography.

Farm pond reservoir areas are affected mainly by seepage loss of water, and the soil features are those that influence such seepage.

Farm pond embankments serve as dams. The features of disturbed soil, from both subsoil and substratum, are those important to use of soils for constructing embankments.

Drainage is influenced by features of the undisturbed soil that affect the installation and performance of surface and subsurface drainage installations.

Irrigation is affected by features of the undisturbed soil that influence soil moisture relations and potential of a soil to produce specific crops. Before an irrigation project is planned, a feasibility study by a qualified consultant is desirable.

Terraces and diversions are affected by soil features that influence stability or hinder layout and construction. Hazards of sedimentation in channels and difficulty of establishment and maintenance of cover also are important considerations for diversions.

Grassed waterways are affected by soil features that are important to establishment, growth, and maintenance of plants or affect layout and construction.

TABLE 4.—*Estimates of soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil, which have of this table. The symbol > means greater

Soil series and map symbols	Depth to		Depth from surface of typical profile	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Ft.	*Ft.*	*In.*			
Allegheny: AgB, AgC, AgD, AgE, AhB, AhC.	5–10	>4	0–7	Loam and gravelly loam	ML or SM	A–4
			7–34	Clay loam and gravelly clay loam.	CL, ML–CL, or GC	A–6
			34–60	Clay loam or sandy clay loam; gravelly clay loam or gravelly sandy clay loam.	SC, CL, or ML–CL	A–2, A–4, A–6
Alluvial land, steep: AlF. No valid estimates can be made.						
Bonnie: Bn	5–10	[2] 0–½	0–48	Silt loam	ML or ML–CL	A–4
Brookside: BoF	6–9	>6	0–5	Stony silt loam	ML	A–4 or A–6
			5–12	Stony heavy silty clay loam	CL	A–7
			12–40	Stony clay	CL or CH	A–7
			40–60	Stony clay	CL or CH	A–7
Bruno: Bu	10+	[2] >4	0–16	Loamy fine sand or fine sand.	SM	A–2
			16–22	Loam	ML	A–4
			22–54	Loamy fine sand or fine sand.	SM	A–2
Caneyville: CaD, CeE	1½–3½	>6	0–4	Heavy silt loam	ML–CL or CL	A–6
			4–32	Silty clay or clay	MH or CH	A–7
			32	Limestone.		
Captina: CmB, CmC	5–10	1½–2	0–12	Silt loam	ML or ML–CL	A–4
			12–22	Heavy silt loam	ML or CL	A–4 or A–6
			22–42	Light silty clay loam (fragipan).	ML–CL or CL	A–6
			42–54	Heavy silt loam	ML or CL	A–6
Clifty: Cn	4–8	[2] >4	0–7	Gravelly silt loam	ML or GM	A–4 or A–2
			7–24	Gravelly silt loam	ML or GM	A–4 or A–2
			24–48	Very gravelly fine sandy loam.	GM or SM	A–2 or A–1
Colyer: CoD, CrF	½–1½	>6	0–12	Silty clay	CL or MH	A–7
			12–15	Clay	GC, CL, or CH	A–2 or A–7
			15	Black shale.		
Cruze: CsB, CsC	4–8	2½–3	0–12	Silt loam	ML or ML–CL	A–4
			12–34	Heavy silty clay loam	CL or MH	A–6 or A–7
			34–46	Silty clay	CH or CL	A–7
Cuba: Cu	5–10	[2] >4	0–48	Silt loam	ML	A–4
*Dekalb: DrC, DrD. For Ramsey part, see Ramsey series.	1½–3½	>6	0–22	Fine sandy loam	SM	A–2 or A–4
			22–30	Fine sandy loam	GM or SM	A–1 or A–2
			30	Sandstone.		
Elk: ElA, ElB, ElC	5–10	>4	0–8	Silt loam	ML or ML–CL	A–4
			8–47	Light silty clay loam	ML–CL	A–4
Fairmount: [3] FeE, FeF	1–1½	>6	0–13	Silty clay and silty clay loam	MH or CL	A–7
			13–16	Clay	MH or CH	A–7
			16	Limestone.		
Gilpin: GlC, GlD, GlD3, GlE	1½–3½	>6	0–9	Silt loam	ML	A–4
			9–28	Light silty clay loam	CL or ML–CL	A–4 to A–6
			28	Shale and sandstone.		

significant in engineering

different properties. For this reason, the reader should follow carefully the instructions for referring to another series in the first column than; the symbol < means less than]

Coarse fraction greater than 3 inches	Percentage passing sieve [1]—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
Pct.					*In. per hr.*	*In. per in. of soil*	*pH*	
0–5	70–100	65–100	60–95	40–75	0. 63–2. 00	0. 12–0. 15	5. 1–5. 5	Low.
0–5	70–100	65–100	60–95	45–80	0. 63–2. 00	0. 11–0. 15	4. 5–5. 5	Low to moderate.
0–5	70–100	65–100	60–95	50–75	0. 63–6. 30	0. 10–0. 15	4. 5–5. 0	Low to moderate.
----------	100	100	95–100	70–90	0. 63–2. 00	0. 18–0. 22	4. 5–5. 5	Low.
10–20	90–95	90–95	80–95	60–85	0. 63–2. 00	0. 16–0. 17	6. 6–7. 3	Low.
10–20	90–95	90–95	85–95	75–90	0. 20–0. 63	0. 15–0. 16	6. 6–7. 3	Moderate.
5–10	95–100	95–100	85–90	70–90	0. 20–0. 63	0. 10–0. 11	6. 6–7. 3	Moderate to high.
10–20	85–90	85–90	75–85	60–80	0. 20–0. 63	0. 09–0. 10	6. 6–7. 3	Moderate to high.
----------	100	100	70–85	15–30	>6. 30	0. 06–0. 08	4. 5–6. 5	Low.
----------	100	100	85–95	60–75	2. 00–6. 30	0. 15–0. 18	4. 5–6. 5	Low.
----------	100	100	70–85	15–30	>6. 30	0. 06–0. 08	4. 5–6. 5	Low.
0–5	100	100	90–100	70–90	0. 20–0. 63	0. 18–0. 22	5. 1–5. 5	Low.
5–10	95–100	95–100	90–100	75–95	0. 06–0. 20	0. 10–0. 12	5. 1–7. 8	Moderate to high.
----------	100	100	90–100	70–90	0. 63–2. 00	0. 18–0. 22	5. 1–5. 5	Low.
----------	100	100	90–100	70–90	0. 63–2. 00	0. 17–0. 18	5. 1–5. 5	Low.
----------	100	100	95–100	85–95	<0. 20	0. 10–0. 13	4. 5–5. 0	Low.
----------	100	100	90–100	70–90	0. 20–0. 63	0. 12–0. 16	4. 5–5. 0	Low.
0–5	55–80	55–80	50–80	40–60	2. 00–6. 30	0. 15–0. 17	5. 6–6. 0	Low.
0–5	55–75	55–75	50–75	35–55	2. 00–6. 30	0. 12–0. 14	5. 1–5. 5	Low.
5–15	30–50	30–50	25–45	15–25	>6. 30	0. 09–0. 10	4. 5–5. 0	Low.
----------	70–80	60–70	60–70	60–70	0. 20–0. 63	0. 07–0. 09	4. 5–5. 0	Moderate.
5–10	60–70	40–60	35–60	35–60	0. 20–0. 63	0. 04–0. 06	<4. 5	Moderate.
----------	90–100	85–100	80–95	70–90	0. 63–2. 00	0. 15–0. 18	5. 1–5. 5	Low.
----------	95–100	90–100	85–100	80–95	0. 20–0. 63	0. 15–0. 17	4. 5–5. 0	Moderate.
----------	85–95	80–95	75–90	70–90	0. 20–0. 63	0. 10–0. 12	4. 5–5. 0	Moderate.
----------	100	100	90–100	70–90	0. 63–2. 00	0. 18–0. 22	5. 1–5. 5	Low.
5–15	70–80	65–75	55–65	30–45	2. 00–6. 30	0. 07–0. 10	4. 5–5. 0	Low.
15–30	60–70	50–60	35–50	20–30	2. 00–6. 30	0. 06–0. 09	4. 5–5. 0	Low.
----------	100	100	95–100	60–80	0. 63–2. 00	0. 18–0. 22	5. 1–5. 5	Low.
----------	100	100	95–100	65–85	0. 63–2. 00	0. 17–0. 18	4. 5–5. 0	Low.
15–20	90–100	90–100	70–85	65–80	0. 20–0. 63	0. 11–0. 12	6. 6–7. 3	Moderate to high.
15–20	90–100	90–100	70–85	70–85	0. 20–0. 63	0. 10–0. 11	6. 6–7. 3	Moderate to high.
----------	85–100	80–90	70–85	60–85	0. 63–2. 00	0. 14–0. 16	5. 1–5. 5	Low.
5–20	75–90	70–85	60–80	55–75	0. 63–2. 00	0. 12–0. 14	4. 5–5. 0	Low.

TABLE 4.—*Estimates of soil properties*

Soil series and map symbols	Depth to		Depth from surface of typical profile	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Ft.	*Ft.*	*In.*			
Gullied land: Gu. No valid estimates can be made.						
Hartsells: HeC	1½–3½	>6	0–14	Fine sandy loam and loam	SM or ML	A–2 or A–4
			14–27	Fine sandy clay loam	SM–SC or CL	A–2 or A–6
			27–35	Sandy loam	SM or SM–SC	A–2 or A–3
			35	Sandstone.		
Huntington: Hu	5–10	[2] >4	0–50	Silt loam	ML or ML–CL	A–4
Jefferson	5–8	>6	0–17	Gravelly loam	ML or GM	A–4
Mapped only with Shelocta soils.			17–30	Gravelly light clay loam	CL, ML–CL, or GC	A–4 or A–6
			30–50	Gravelly loam	GM	A–4, A–2, or A–1
Lanton: LaA	5–10	[2] 0–½	0–10	Silt loam	ML	A–4
			10–46	Light silty clay loam	CL or ML–CL	A–6 or A–7
*Latham: LbC, LbD, LcE, LcF	6–10	>6	0–4	Silt loam	ML or ML–CL	A–4 or A–6
For Shelocta part of LcE and LcF, see Shelocta series.			4–32	Heavy silty clay loam or silty clay or clay.	CL, ML, or MH	A–7
			32–48	Clay	MH or CH	A–7
			48	Soft shale.		
Lindside: Ld	5–10	[2] 2½–3	0–42	Silt loam	ML or CL	A–4 or A–6
Melvin: Me	5–10	[2] 0–½	0–50	Silt loam	ML or CL	A–4 or A–6
Monongahela: MoB	5–10	1½–2	0–11	Fine sandy loam or light sandy clay loam.	SM	A–2 or A–4
			11–23	Light clay loam	CL or ML–CL	A–4 or A–6
			23–51	Clay loam (fragipan)	CL or CH	A–6
Morehead: Mr	6–10	½–1½	0–13	Silt loam	ML	A–4
			13–48	Light silty clay loam	CL or ML–CL	A–6
Muse: MsC, MsD	4–6	>4	0–7	Silt loam	ML	A–4
			7–32	Silty clay loam	CL or CH	A–6 or A–7
			32–36	Silty clay	CH or MH	A–7
Newark: Ne	5–10	[2] ½–1½	0–18	Silt loam	ML or ML–CL	A–4
			18–50	Silt loam	ML or CL	A–4 or A–6
Pope: Po	5–10	[2] >4	0–52	Loam	ML	A–4
Purdy: Pu	5–20	[2] 0–½	0–10	Silt loam	ML	A–4
			10–56	Heavy silty clay loam	CL or CH	A–6 or A–7
Ramsey	1–1½	>6	0–5	Fine sandy loam	SM	A–2 or A–4
Mapped only with Dekalb soils.			5–15	Fine sandy loam	GM or SM	A–1 or A–2
*Shelocta: SeB, SeC, SeD, SlF, SoF.	4–8	>4	0–8	Silt loam or gravelly silt loam	ML	A–4
For Jefferson part of SoF, see Jefferson series.			8–45	Gravelly light silty clay loam	ML or CL	A–6
			45–52	Very gravelly light silty clay loam.	GM or GC	A–1 or A–2
Shrouts: SrE, SsE3	5–10	>6	0–6	Silty clay loam	CL or CH	A–7
			6–34	Silty clay or clay	CH or MH	A–7
			34	Soft shale.		
Stendal: St, Su	5–10	[2] ½–1½	0–48	Silt loam, gravelly silt loam, or clay loam.	ML	A–4

significant in engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve [1]—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
Pct.					*In. per hr.*	*In per in. of soil*	*pH*	
----------	95–100	95–100	85–95	30–55	2. 00–6. 30	0. 13–0. 15	4. 5–5. 5	Low.
----------	85–95	80–95	75–90	35–55	2. 00–6. 30	0. 10–0. 12	4. 5–5. 0	Low.
0–2	65–80	60–80	55–70	10–30	2. 00–6. 30	0. 08–0. 10	4. 5–5. 0	Low.
----------	100	100	90–100	60–95	0. 63–2. 00	0. 15–0. 18	6. 1–6. 5	Low.
0–5	55–75	55–75	50–70	35–55	2. 00–6. 30	0. 15–0. 17	4. 5–5. 5	Low.
0–5	55–75	55–75	50–70	40–60	2. 00–6. 30	0. 16–0. 18	4. 5–5. 5	Low.
0–5	30–65	30–65	25–60	20–40	2. 00–6. 30	0. 10–0. 12	4. 5–5. 5	Low.
----------	100	100	90–100	80–90	0. 20–0. 63	0. 17–0. 18	6. 6–7. 3	Low.
----------	100	100	95–100	85–95	0. 20–0. 63	0. 17–0. 18	6. 6–7. 3	Low to moderate.
----------	95–100	95–100	85–95	75–90	0. 63–2. 00	0. 17–0. 18	4. 5–5. 0	Low.
----------	95–100	95–100	85–95	75–90	0. 06–0. 20	0. 10–0. 15	4. 5–5. 0	Moderate.
----------	80–90	70–85	65–85	60–80	0. 06–0. 20	0. 09–0. 10	4. 5–5. 0	Moderate to high.
----------	100	100	95–100	80–95	0. 63–2. 00	0. 18–0. 22	6. 1–7. 3	Low.
----------	100	100	90–100	85–95	0. 63–2. 00	0. 18–0. 22	6. 1–7. 3	Low.
----------	100	100	70–85	30–50	0. 63–2. 00	0. 13–0. 14	4. 5–5. 5	Low.
----------	100	100	80–100	60–80	0. 63–2. 00	0. 14–0. 16	4. 5–5. 0	Low.
----------	100	100	90–100	65–80	0. 06–0. 20	0. 10–0. 13	4. 5–5. 0	Low to moderate.
----------	100	100	90–100	80–95	0. 63–2. 00	0. 18–0. 22	4. 5–5. 0	Low.
----------	100	100	95–100	85–95	0. 63–2. 00	0. 17–0. 18	4. 5–5. 0	Low to moderate.
----------	100	100	95–100	85–95	0. 63–2. 00	0. 18–0. 22	5. 1–5. 5	Low.
----------	100	100	95–100	90–95	0. 20–0. 63	0. 17–0. 18	4. 5–5. 5	Low to moderate.
----------	95–100	95–100	90–100	90–95	0. 20–0. 63	0. 12–0. 15	4. 5–5. 0	Low to moderate.
----------	100	100	95–100	85–95	0. 63–2. 00	0. 18–0. 22	6. 6–7. 3	Low.
----------	100	100	100	95–100	0. 63–2. 00	0. 18–0. 22	6. 6–7. 3	Low.
----------	100	100	85–95	60–75	2. 00–6. 30	0. 15–0. 18	5. 1–5. 5	Low.
----------	100	100	95–100	85–95	0. 63–2. 00	0. 18–0. 22	4. 5–5. 5	Low.
----------	100	100	95–100	90–95	0. 20–0. 63	0. 15–0. 17	4. 5–5. 0	Moderate.
2–5	70–80	50–65	30–55	25–45	>6. 30	0. 07–0. 10	4. 5–5. 0	Low.
15–30	60–65	40–60	25–50	15–30	>6. 30	0. 06–0. 09	4. 5–5. 0	Low.
0–5	75–90	75–90	70–85	60–70	0. 63–2. 00	0. 15–0. 16	4. 5–5. 5	Low.
5–10	65–80	65–80	65–80	60–70	0. 63–2. 00	0. 12–0. 14	4. 5–5. 0	Low.
5–15	30–45	25–40	25–40	20–35	0. 63–2. 00	0. 10–0. 14	4. 5–5. 0	Low.
----------	100	100	95–100	85–95	0. 20–0. 63	0. 16–0. 17	6. 6–7. 3	Moderate.
----------	100	100	95–100	90–95	0. 06–0. 20	0. 11–0. 12	7. 9–8. 4	High.
0–5	80–100	75–90	75–90	65–90	0. 63–2. 00	0. 15–0. 18	5. 1–5. 5	Low.

TABLE 4.—*Estimates of soil properties*

Soil series and map symbols	Depth to		Depth from surface of typical profile	Classification		
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO
	Ft.	*Ft.*	*In.*			
Trappist: TrB, TrC	1½–3½	>6	0–7	Silt loam	ML or ML–CL	A–4
			7–28	Silty clay loam or silty clay	CL or CH	A–6 or A–7
			28–32	Silty clay	CH, MH, or GC	A–7
			32	Black shale.		
Whitley: WhB, WhC, WhD	3½–5	>6	0–13	Silt loam	ML or ML–CL	A–4
			13–37	Light silty clay loam	CL or ML–CL	A–6
			37–48	Silt loam	GM	A–4 or A–2
Woolper: WoC	5–10	>4	0–8	Silty clay loam	CL or ML–CL	A–6
			8–32	Heavy silty clay loam or silty clay.	CL or MH–CH	A–7
			32–51	Silty clay or clay	CH or MH–CH	A–7

[1] Fragments larger than 3 inches are excluded from estimates.
[2] Subject to flooding.

TABLE 5.—*Interpretations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil, which may in the first column

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway and road location	Ponds	
				Reservoir area	Embankment
Allegheny: AgB, AgC, AgD, AgE, AhB, AhC.	Fair: some gravelly areas.	Fair: A–4 or A–6 material; fair stability.	Features generally favorable.	Pervious material	Pervious material; fair stability; subject to piping.
Alluvial land, steep: AlF. No interpretations. Material too variable.					
Bonnie: Bn	Fair: seasonal water table at depth of 0 to 6 inches; subject to flooding.	Fair: A–4 material; seasonal water table at depth of 0 to 6 inches; subject to flooding.	Seasonal water table at depth of 0 to 6 inches; subject to flooding.	Seasonal water table at depth of 0 to 6 inches; subject to flooding; pervious material.	Seasonal water table at depth of 0 to 6 inches; fair stability.
Brookside: BoF	Poor: stony and clayey below depth of 5 inches.	Poor: A–6 or A–7 material; highly plastic; steep slopes; stony.	Steep slopes; moderate to high shrink-swell potential.	Steep slopes	Steep slopes; highly plastic.
Bruno: Bu	Poor: sandy	Good: A–2 material.	Subject to flooding	Very pervious material; subject to flooding.	Very pervious material; subject to piping.
Caneyville: CaD, CeE.	Poor: rock at depth of 1½ to 3½ feet; some areas of rock outcrops.	Poor: A–6 or A–7 material; rock at depth of 1½ to 3½ feet.	Rock at depth of 1½ to 3½ feet; plastic material.	Possible solution channels; rock at depth of 1½ to 3½ feet.	Clayey; moderate to high shrink-swell potential.

significant in engineering—Continued

Coarse fraction greater than 3 inches	Percentage passing sieve [1]—				Permeability	Available water capacity	Reaction	Shrink-swell potential
	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
Pct.					*In. per hr.*	*In per in. of soil*	*pH*	
----------	100	100	95–100	85–95	0. 63–2. 00	0. 17–0. 18	5. 1–6. 0	Low.
----------	95–100	95–100	90–95	85–95	0. 20–0. 63	0. 12–0. 17	4. 5–5. 5	Moderate.
0–5	55–95	40–90	40–90	40–85	0. 20–0. 63	0. 08–0. 12	4. 5–5. 0	Moderate.
----------	95–100	95–100	85–95	75–85	0. 63–2. 00	0. 17–0. 18	4. 5–5. 0	Low.
----------	95–100	95–100	90–95	80–90	0 63–2 00	0 16–0 17	4. 5–5. 0	Low.
5–15	40–60	35–55	35–55	30–45	0. 63–2. 00	0. 12–0. 13	4. 5–5. 0	Low.
----------	100	100	95–100	85–95	0. 20–0. 63	0. 17–0. 18	6. 6–7. 3	Low to moderate.
----------	95–100	95–100	90–95	85–90	0. 20–0. 63	0. 12–0. 15	6. 6–7. 8	Moderate to high.
----------	95–100	95–100	90–95	80–90	0. 20–0. 63	0. 10–0. 12	7. 4–7. 8	Moderate to high.

[1] About 25 to 50 percent of mapping units is limestone rock outcrop.

of engineering properties

have different engineering interpretations. For this reason, the reader should follow carefully the instructions for referring to another series of this table]

Soil features affecting—Continued					
Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Not needed	Some slopes more than 10 percent.	Some slopes more than 10 percent.	Slopes 2 to 30 percent; features generally favorable.	Moderate frost action.	Features generally favorable.
Moderate permeability; seasonal water table at depth of 0 to 6 inches; subject to flooding.	Seasonal water table at depth of 0 to 6 inches; subject to flooding.	Flood plain	Flood plain	Seasonal water table at depth of 0 to 6 inches; subject to flooding.	Seasonal water table at depth of 0 to 6 inches; subject to flooding.
Not needed	Steep slopes	Steep slopes	Steep slopes	Plastic material; steep slopes.	Stony; steep slopes.
Not needed	Low available water capacity; subject to flooding.	Flood plain	Flood plain	Subject to flooding	Loose sand; subject to flooding.
Not needed	Most slopes more than 10 percent; slow permeability.	Most areas more than 10 percent slopes; some rock outcrops; clayey subsoil.	Rock at depth of 1½ to 3½ feet; clayey subsoil; slopes 6 to 30 percent.	Plastic material	Rock at depth of 1½ to 3½ feet; some areas of rock outcrops.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway and road location	Ponds	
				Reservoir area	Embankment
Captina: CmB, CmC.	Fair: seasonal water table at depth of 1½ to 2 feet.	Fair: A–4 and A–6 material; seasonal water table at depth of 1½ to 2 feet.	Seasonal water table at depth of 1½ to 2 feet.	Features generally favorable.	Fair stability.
Clifty: Cn.	Poor: gravelly.	Fair to good: A–2 and A–4 material.	Subject to flooding.	Pervious material; subject to flooding.	Pervious material; subject to flooding; subject to piping.
Colyer: CoD, CrF.	Poor: rock at depth of ½ foot to 1½ feet.	Poor: A–7 material; very limited quantity.	Rock at depth of ½ foot to 1½ feet; some steep slopes.	Shale at depth of ½ foot to 1½ feet.	Limited quantity.
Cruze: CsB, CsC.	Fair: clayey below depth of 12 inches.	Poor: A–6 or A–7 material below depth of 12 inches; seasonal water table at depth of 2½ to 3 feet.	Seasonal water table at depth of 2½ to 3 feet; plastic material below depth of 12 inches.	Features generally favorable.	Moderate shrink-swell potential; medium to high compressibility.
Cuba: Cu.	Good: subject to flooding.	Fair: A–4 material; subject to flooding; medium compressibility.	Subject to flooding; medium compressibility.	Pervious material; subject to flooding.	Fair stability; moderate permeability.
*Dekalb: DrC, DrD. For Ramsey part, see Ramsey series.	Fair: rock fragments.	Good: rock at depth of 1½ to 3½ feet; some areas of rock outcrops.	Rock at depth of 1½ to 3½ feet; some areas of rock outcrops.	Pervious material; rock at depth of 1½ to 3½ feet.	Pervious material; subject to piping.
Elk: ElA, ElB, ElC.	Good.	Fair: A–4 material; medium compressibility.	Features generally favorable.	Pervious material.	Fair stability; fair compaction characteristics.
Fairmount: FeE, FeF.	Poor: rock at depth of 1 foot to 1½ feet; numerous areas of rock outcrops; clayey.	Poor: A–7 material; limited quantity; moderate to high shrink-swell potential.	Numerous areas of outcrops; mostly steep slopes; rock at depth of 1 foot to 1½ feet; plastic material.	Possible solution channels; rock at depth of 1 foot to 1½ feet.	Limited quantity; clayey; moderate to high shrink-swell potential.
Gilpin: GlC, GlD, GlD3, GlE.	Fair to good: rock at depth of 1½ to 3½ feet.	Fair: A–4 or A–6 material; rock at depth of 1½ to 3½ feet; medium compressibility.	Rock at depth of 1½ to 3½ feet; some steep slopes.	Rock at depth of to 1½ to 3½ feet; semipervious material.	Semipervious material; fair stability; fair compaction characteristics.
Gullied land: Gu. No interpretations. Material too variable.					
Hartsells: HeC.	Good.	Good to fair: A–2, A–4, and A–6 material; rock at depth of 1½ to 3½ feet.	Rock at depth of 1½ to 3½ feet.	Pervious material; rock at depth of 1½ to 3½ feet.	Pervious material; subject to piping.

engineering properties—Continued

Soil features affecting—Continued					
Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Slow permeability; fragipan at depth of about 22 inches.	Slow permeability; fragipan at depth of about 22 inches.	Fragipan at depth of about 22 inches.	Slopes 2 to 12 percent; moderately well drained.	Seasonal water table at depth of 1½ to 2 feet; high frost action.	Seasonal water table at depth of 1½ to 2 feet.
Not needed	Moderate available water capacity; subject to flooding.	Flood plain	Flood plain	Subject to flooding	Subject to flooding.
Not needed	Most slopes more than 10 percent; low available water capacity.	Most slopes more than 10 percent.	Rock at depth of ½ foot to 1½ feet; slopes 6 to 50 percent; low available water capacity.	Plastic material; some steep slopes.	Rock at depth of ½ foot to 1½ feet; some steep slopes.
Not needed	Moderately slow permeability.	Some slopes more than 10 percent.	Slopes 2 to 15 percent; clayey.	Plastic material; seasonal water table at depth of 2½ to 3 feet.	Seasonal water table at depth of 2½ to 3 feet.
Not needed	Subject to flooding	Flood plain	Flood plain	Subject to flooding; high frost action.	Subject to flooding.
Not needed	Moderate available water capacity; some slopes more than 10 percent.	Some areas of rock outcrops; some slopes more than 10 percent.	Erodible; slopes 6 to 20 percent; some areas of rock outcrops; rock at depth of 1½ to 3½ feet.	Some rock outcrops	Some areas of rock outcrops; rock at depth of 1½ to 3½ feet.
Not needed	Features generally favorable.	Features generally favorable.	Features generally favorable.	Moderate frost action.	Features generally favorable.
Not needed	Slopes more than 10 percent.	Slopes more than 10 percent; some rock outcrops.	Rock at depth of 1 foot to 1½ feet; slopes 12 to 60 percent.	Plastic material; mostly steep slopes.	Rock at depth of 1 foot to 1½ feet; numerous rock outcrops; mostly steep slopes.
Not needed	Rock at depth of 1½ to 3½ feet; some slopes more than 10 percent.	Rock at depth of 1½ to 3½ feet; some slopes more than 10 percent.	Rock at depth of 1½ to 3½ feet; slopes 6 to 30 percent.	Moderate frost action.	Rock at depth of 1½ to 3½ feet.
Not needed	Moderate available water capacity.	Rock at depth of 1½ to 3½ feet.	Rock at depth of 1½ to 3½ feet; slopes 6 to 12 percent; erodible.	Moderate frost action.	Rock at depth of 1½ to 3½ feet.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway and road location	Ponds	
				Reservoir area	Embankment
Huntington: Hu	Good: subject to flooding.	Fair: A–4 material; medium compressibility; subject to flooding.	Subject to flooding	Pervious material; subject to flooding.	Fair stability; fair compaction characteristics; piping hazard.
Jefferson. Mapped only with Shelocta soils.	Poor: gravelly	Fair: A–4 material.	Steep slopes	Steep slopes; pervious material.	Pervious material; piping hazard.
Lanton: LaA	Fair: seasonal water table at depth of 0 to ½ foot; subject to flooding.	Fair to poor: A–4, A–6, or A–7 material; medium compressibility; subject to flooding; seasonal water table at depth of 0 to ½ foot.	Seasonal water table at depth of 0 to ½ foot; medium compressibility; subject to flooding.	Seasonal water table at depth of 0 to ½ foot; subject to flooding.	Fair stability; medium compressibility.
*Latham: LbC, LbD, LcE, LcF. For Shelocta part of LcE and LcF, see Shelocta series.	Poor: clayey below depth of 4 inches.	Poor: A–7 material; fair to poor stability.	Fair to poor stability; plastic.	Some steep slopes	Fair to poor stability; plastic.
Lindside: Ld	Good: subject to flooding.	Fair: A–4 or A–6 material; medium compressibility.	Seasonal water table at depth of 2½ to 3 feet; medium compressibility; subject to flooding.	Pervious material; seasonal water table at 2½ to 3 feet; subject to flooding.	Fair stability; fair compaction characteristics; piping hazard.
Melvin: Me	Fair: seasonal water table at depth of 0 to ½ foot; subject to flooding.	Fair: A–4 or A–6 material; medium compressibility; seasonal water table at depth of 0 to ½ foot; subject to flooding.	Seasonal water table at depth of 0 to ½ foot; medium compressibility.	Pervious material; seasonal water table at depth of 0 to ½ foot; subject to flooding.	Fair stability; piping hazard.
Monongahela: MoB.	Good	Fair: A–2, A–4, and A–6 material; medium compressibility.	Seasonal water table at depth of 1½ to 2 feet.	In places has pervious layers in substratum; seasonal water table at depth of 1½ to 2 feet.	Fair stability; medium compressibility.
Morehead: Mr	Fair: seasonal water table at depth of ½ foot to 1½ feet.	Fair to poor: A–4, A–6, or A–7 material; medium compressibility.	Seasonal water table at depth of ½ foot to 1½ feet; medium compressibility.	Seasonal water table at depth of ½ foot to 1½ feet.	Fair stability; medium compressibility.
Muse: MsC, MsD	Fair: clayey below depth of 7 inches.	Poor: A–6 or A–7 material; fair to poor stability.	Shale at depth of 4 to 6 feet; fair to poor stability.	Features generally favorable.	Fair to poor stability; high compressibility.
Newark: Ne	Fair: seasonal water table at depth of ½ foot to 1½ feet.	Fair: A–4 to A–6 material; seasonal water table at depth of ½ foot to 1½ feet.	Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Pervious material; seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Fair stability; fair compaction characteristics; piping hazard.

engineering properties—Continued

Soil features affecting—Continued					
Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Not needed	Subject to flooding	Flood plain	Flood plain	Moderate frost action.	Subject to flooding.
Not needed	Steep slopes	Steep slopes	Steep slopes	Steep slopes	Steep slopes.
Moderately slow permeability; seasonal water table at depth of 0 to ½ foot; subject to flooding.	Seasonal water table at depth of 0 to ½ foot; subject to flooding; poorly drained.	Flood plain	Flood plain	Seasonal water table at depth of 0 to ½ foot; subject to flooding.	Seasonal water table at depth of 0 to ½ foot; subject to flooding.
Not needed	Slow permeability; some slopes more than 10 percent.	Some slopes more than 10 percent; clayey subsoil.	Slopes 6 to 60 percent; clayey.	Plastic material	Plastic material; some steep slopes.
Seasonal water table at depth of 2½ to 3 feet; subject to flooding.	Subject to flooding	Flood plain	Flood plain	Seasonal water table at depth of 2½ to 3 feet; subject to flooding; high frost action.	Seasonal water table at depth of 2½ to 3 feet; subject to flooding.
Seasonal water table at depth of 0 to ½ foot; subject to flooding.	Seasonal water table at depth of 0 to ½ foot; subject to flooding; poorly drained.	Flood plain	Flood plain	Seasonal water table at depth of 0 to ½ foot; subject to flooding.	Seasonal water table at depth of 0 to ½ foot; subject to flooding.
Slow permeability; fragipan at depth of about 23 inches.	Slow permeability in fragipan at depth of about 23 inches; seasonal water table at depth of 1½ to 2 feet.	Fragipan at depth of about 23 inches.	Slopes 2 to 6 percent; fragipan at depth of about 23 inches.	Seasonal water table at depth of 1½ to 2 feet; moderate frost action.	Seasonal water table at depth of 1½ to 2 feet.
Moderate permeability.	Seasonal water table at depth of ½ foot to 1½ feet; somewhat poorly drained.	Nearly level slopes	Nearly level slopes	Seasonal water table at depth of ½ foot to 1½ feet; moderate frost action.	Seasonal water table at depth of ½ foot to 1½ feet.
Not needed	Some slopes more than 10 percent.	Some slopes more than 10 percent.	Slopes 6 to 20 percent.	Plastic material	Shale at depth of 4 to 6 feet.
Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding; somewhat poorly drained.	Flood plain	Flood plain	Seasonal water table at depth of ½ foot to 1½ feet; moderate frost action; subject to flooding.	Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability as a source of—		Soil features affecting—		
	Topsoil	Road fill	Highway and road location	Ponds	
				Reservoir area	Embankment
Pope: Po	Good: subject to flooding.	Fair to good: A–4 material; subject to flooding.	Subject to flooding	Pervious material; subject to flooding.	Fair stability; fair compaction characteristics; piping hazard.
Purdy: Pu	Fair to depth of 10 inches; poor below that depth; seasonal water table at depth of 0 to ½ foot.	Poor: A–4, A–6, or A–7 material; seasonal water table at depth of 0 to ½ foot; fair to poor stability.	Seasonal water table at depth of 0 to ½ foot; medium compressibility.	Seasonal water table at depth of 0 to ½ foot.	Fair to poor stability; medium compressibility.
Ramsey. Mapped only with Dekalb soils.	Fair: rock fragments; rock at depth of 1 foot to 1½ feet; some areas of rock outcrops.	Good: rock at a depth of 1 foot to 1½ feet; some areas of rock outcrops.	Rock at a depth of 1 foot to 1½ feet; some areas of rock outcrops.	Pervious material; rock at depth of 1 foot to 1½ feet.	Limited quantity; pervious material; subject to piping.
*Shelocta: SeB, SeC, SeD, SlF, SoF. For Jefferson part of SoF, see Jefferson series.	Fair to depth of 8 inches; poor below that depth; gravelly.	Fair: A–4 or A–6 material to depth of 45 inches; fair stability.	Mostly steep slopes	Pervious material; mostly steep slopes.	Fair stability
Shrouts: SrE, SsE3.	Poor: clayey	Poor: A–7 material; plastic.	Poor stability; subject to slides.	Some steep slopes	Poor stability; clayey; moderate to high compressibility.
Stendal: St, Su	Fair: seasonal water table at depth of ½ foot to 1½ feet; some gravelly areas.	Fair: A–4 material; seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Pervious material; seasonal water table at depth of 1 foot to 1½ feet; subject to flooding.	Pervious material; fair stability; fair compaction characteristics; piping hazard.
Trappist: TrB, TrC.	Poor: clayey below depth of 7 inches; rock at depth of 1½ to 3½ feet.	Poor: A–6 and A–7 material; rock at depth of 1½ to 3½ feet.	Shale at depth of 1½ to 3½ feet; plastic material.	Shale at depth of 1½ to 3½ feet.	Fair to poor stability; fair to poor compaction characteristics.
Whitley: WhB, WhC, WhD.	Good	Fair: A–4 and A–6 material; A–4 or A–2 material below depth of 3 feet.	Rock at depth of 3½ to 5 feet.	Pervious material; rock at depth of 3½ to 5 feet.	Fair stability
Woolper: WoC	Fair to depth of 8 inches; poor below that depth; clayey.	Poor: A–7 material; moderate to high shrink-swell potential; plastic.	Medium to high compressibility; fair to poor stability; plastic.	Features generally favorable.	Fair to poor stability; fair to poor compaction characteristics; plastic.

engineering properties—Continued

Soil features affecting—Continued					
Drainage	Sprinkler irrigation	Terraces or diversions	Grassed waterways	Winter grading	Pipeline construction and maintenance
Not needed	Subject to flooding	Flood plain	Flood plain	Moderate frost action.	Subject to flooding.
Moderately slow permeability; seasonal water table at depth of 0 to ½ foot.	Moderately slow permeability; seasonal water table at depth of 0 to ½ foot; poorly drained.	Nearly level slopes	Nearly level slopes	Seasonal water table at depth of 0 to ½ foot; moderate frost action.	Seasonal water table at depth of 0 to ½ foot.
Not needed	Low available water capacity; some slopes more than 10 percent.	Rock at depth of 1 foot to 1½ feet; some areas of rock outcrops; some slopes more than 10 percent.	Rock at depth of 1 foot to 1½ feet; some areas of rock outcrops; erodible; slopes 6 to 20 percent.	Some rock outcrops; rock at depth of 1 foot to 1½ feet.	Rock at depth of 1 foot to 1½ feet; some areas of rock outcrops.
Not needed	Most slopes more than 10 percent.	Most slopes more than 10 percent.	Slopes 2 to 60 percent; some gravelly areas.	Moderate frost action; mostly steep slopes.	Mostly steep slopes.
Not needed	Slopes more than 10 percent; slow permeability.	Slopes more than 10 percent; clayey subsoil.	Slopes 12 to 40 percent; clayey.	Plastic material	Some steep slopes; clayey.
Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Somewhat poorly drained; seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.	Flood plain	Flood plain	Seasonal water table at depth of ½ foot to 1½ feet; moderate frost action; subject to flooding.	Seasonal water table at depth of ½ foot to 1½ feet; subject to flooding.
Not needed	Moderately slow permeability; moderate available water capacity.	Shale at depth of 1½ to 3½ feet.	Slopes 2 to 12 percent; shale at depth of 1½ to 3½ feet.	Plastic	Hard shale at depth of 1½ to 3½ feet.
Not needed	Some slopes more than 10 percent.	Some areas more than 10 percent slopes.	Slopes 2 to 20 percent.	Moderate frost action.	Rock at depth of 3½ to 5 feet.
Not needed	Moderately slow permeability.	Clayey subsoil	Slopes 6 to 12 percent; clayey subsoil.	Plastic	Plastic.

Winter grading is affected chiefly by soil features relevant to moving, mixing, and compacting soil in roadbuilding when temperatures are below freezing.

Pipeline construction and maintenance are affected by such soil features as depth to bedrock, erodibility, and depth to the water table. Corrosivity of uncoated steel is influenced by low pH value, the water table, and organic-matter content.

Ratings of soils for suitability as a source of sand and gravel are normally given in table 5. In Estill and Lee Counties, however, only Bruno and Clifty soils are potential sources of sand and gravel. Both these soils are rated poor because they contain excessive amounts of fine material.

Soil Interpretations for Town and Country Planning

Soils are important in planning town and country uses of the land. The interpretations in this section point out soil-related limitations that can be expected and have to be considered. Even the most severe limitations listed can be overcome if the cost involved can be justified. The information given here is not intended to eliminate the need of onsite investigations for specific uses but, rather, to serve as a guide for screening sites and planning more detailed investigations.

Table 6 shows the estimated degree and kind of limitation for stated community and recreational uses of the soils. A rating of *slight* means the limitations, if any, are of minor consequence and are easy to overcome. A rating of *moderate* means the limitations require careful planning, design, and management to overcome. Cost of corrective measures is an important consideration. A soil rated *severe* means the limitations are severe enough that cost of corrective measures may be too high to justify the intended use.

The kinds of limitations, expressed in terms of soil characteristics or properties, are shown only where the degree of limitation is moderate or severe. Some kinds of limitations are expressed in terms that may not be found in a standard dictionary or that have special meaning. These are defined in the Glossary in the back of this survey.

The criteria used to determine the degree and kind of limitations to various uses shown in table 6 are defined in the following paragraphs.

Sewage effluent disposal.—Soil features used as the basis for rating the soils are permeability, depth to seasonal water table, depth to bedrock, surface rockiness and stoniness, slope, and the hazard of flooding. Possible pollution hazards to a water supply source are not considered here but would be a severe limitation.

Sewage lagoons.—These are shallow ponds used for disposal of sewage by oxidation. Soil features used as the basis for rating the soils are permeability (basin floor), content of organic matter, slope, depth to bedrock, quantity of coarse fragments (less than 10 inches in diameter), surface stoniness, kind of soil material at site, and the hazard of flooding.

Building locations.—This use includes dwellings and service buildings, with basements, limited to three stories or less. The ratings for this use are based on depth to seasonal water table, depth to bedrock, slope, surface rockiness and stoniness, frost action, shrink-swell potential, and the hazard of flooding. Slope is more restrictive for subdivision locations than for other uses.

County and access roads.—This use includes normal hard-surface roads used by traffic in the county and in small towns. The ratings are based on depth to seasonal water table, slope, depth to bedrock, surface rockiness and stoniness, traffic-supporting capacity, and the hazard of flooding.

Streets and parking lots in subdivisions.—Ratings are based on depth to seasonal water table, slope, depth to bedrock, surface rockiness and stoniness, traffic-supporting capacity, and the hazard of flooding. Slope is a more restrictive feature for parking lots and streets than for county and access roads.

Campsites for trailers and tents.—Ratings for this intensive use are based on depth to bedrock, permeability, depth to seasonal water table, surface rockiness and stoniness, texture of surface layer, and the hazard of flooding. Slope is more restrictive for trailer parks than for tent areas.

Athletic fields.—Intensive use for such sports as baseball, football, and volleyball normally requires the finished area to be nearly level, and it would be subjected to heavy foot traffic. Ratings are based on depth to seasonal water table, soil permeability, slope, depth to bedrock, surface rockiness and stoniness, surface layer texture, and the hazard of flooding.

Play and picnic areas.—These areas would be subject to less intensive use than athletic fields. The ratings are based on depth to seasonal water table, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and the hazard of flooding. These soil features are less restrictive for play and picnic areas than for athletic fields.

Lawns, landscaping, and golf fairways.—For these uses, it is assumed that soil material at the site will be used. No importation of fill or topsoil is considered in the ratings. The ratings are based on depth to seasonal water table, slope, depth to bedrock, surface stoniness and rockiness, texture of the surface layer, and the hazard of flooding.

Cemeteries.—This use means community-type cemeteries. It is assumed that soil material at the site will be used. No consideration is given to importation of fill or topsoil in the ratings. The soil features to consider are depth to seasonal water table, slope, permeability, depth to bedrock, surface rockiness and stoniness, surface layer texture, and the hazard of flooding.

Paths and trails.—These are for such nonintensive uses as cross-country hiking and bridle paths. These activities allow random movement of people. It is assumed that the areas will be used as they occur in nature. The soil features on which the ratings are based are wetness, slope, surface rockiness and stoniness, surface layer texture, and the hazard of flooding.

Sanitary landfill.—The soils are not rated in table 6 for use as disposal areas for trash and garbage. In general, suitable sites can be located on soils that are deep over bedrock, are not subject to flooding, are relatively free of stones and rock outcrops, do not have a high

seasonal water table, are nearly level, and are not a source of pollution to a water supply.

Formation and Classification of Soils

This section has two main parts. The first part describes the factors of soil formation and tells how they have influenced formation of soils in Estill and Lee Counties. The second part explains the current system of soil classification and classifies the soils of Estill and Lee Counties in some higher categories. The soil series represented in these two counties and a profile representative of each series are described in the section "Descriptions of the Soils."

Formation of Soils

The characteristics of the soil at any given point depend on (1) climate, (2) the physical and chemical composition of the parent material, (3) relief, (4) plant and animal life, and (5) time. Soil is formed by the interaction of these five factors. The relative importance of each factor differs from one area to another. In some areas one factor may dominate in the formation of soil characteristics, and in other areas another factor may dominate. Climate and plant and animal life are not likely to vary much within an area the size of one, two, or three contiguous counties, but there may be many local differences in relief and parent material.

Because the interrelationships among the five factors are complex, the effects of any one factor are difficult to determine. Following is a brief discussion of some of the ways in which each of these factors has influenced the formation of soils in Estill and Lee Counties.

Climate

The climate of Estill and Lee Counties is temperate and moist, and it is presumed to have been similar throughout the period when the soils formed. Generally, summers are warm and humid, winters are moderately cold, and precipitation is well distributed throughout the year. The climate is uniform throughout the two counties; therefore, differences in the soils apparently were not caused by differences in climate.

Climate affects the kind and number of plants and animals, the weathering of rocks and minerals, the degree of erosion, and the rate of soil formation. Practically all the native vegetation is hardwood forests. Because dry periods and periods of freezing temperatures are only of short duration, weathering and the other processes of soil formation take place nearly continuously. Most soluble bases have been leached during soil formation. As a result, most soils are strongly acid. Clay minerals have been moved from the surface layer into the subsoil; consequently, most soils have a higher clay content in the subsoil than in the surface layer. Whitley and Trappist soils are examples.

Parent material

Parent material is the unconsolidated mass from which a soil forms. It varies greatly from place to place, and it accounts for many differences in the soils of Estill and Lee Counties. Many soils are residual, that is, they formed in material weathered from underlying rock. Others are colluvial soils that formed in parent material moved only a short distance from the place where it originated. Still other soils formed in alluvial material washed from soils formed from various kinds of parent material.

In the mountainous part of the survey area, most soils formed in parent material weathered from acid shale, siltstone, or sandstone or in parent material derived from these rocks. Soils that formed in parent material weathered from shale have a high content of clay. The Latham soils are examples. Soils that formed in parent material weathered from siltstone have a high content of silt and a medium content of clay. The Whitley soils are examples. Soils that formed in parent material weathered from sandstone have a high content of sand. The Dekalb soils are examples.

All soils that formed in material weathered from these rocks are strongly acid and are low in bases. Brookside soils, which occur mostly in the mountainous part of Estill County, lie below a limestone bluff. They have a high content of clay, but they are neutral in reaction and high in bases. In the Knobs part of Estill County, the soils that formed in parent material weathered from black shale have a high content of clay, are strongly acid, and are low in bases. The Trappist soils are examples. In the northwestern part of Estill County, the steep soils on hillsides formed in parent material weathered from limestone. They have a high content of clay, are neutral in reaction, and are high in bases. The alluvium in which some of the soils formed has washed from many different soils. In Estill County the soils formed in alluvium are neutral to slightly acid, as a result of drainage from limestone areas. The Huntington soil is an example. In Lee County they are strongly acid, because only on the very western edge of the county is any limestone exposed. The Cuba soil is an example.

Relief

Relief influences soil formation through its influence on drainage, erosion, plant cover, and soil temperature. Relief varies widely and accounts for many differences in the soils of Estill and Lee Counties.

Some nearly level soils on flood plains and stream terraces have had an excess of water during formation. A gray subsoil is characteristic and is the result of a lack of oxidation. The Morehead soil is an example. A fragipan often forms under these conditions, as in the Captina soil. Gently sloping and sloping soils show more clearly the influence of all soil-forming factors. Excess water runs off without excessive erosion, and a normal soil profile is developed. The Whitley soils are examples. Some steep soils are shallow and show slight development, because geologic erosion is rapid and little water infiltrates and percolates through the soil. The Fairmount soils are examples. Most steep soils on mountainsides are deep, which is the result of colluvial material slowly moving down the slopes and of weathering of the underlying rock proceeding at a faster rate than geologic erosion. Brookside and Shelocta soils are examples. Soil temperature and plant cover differ slightly from north

TABLE 6.—*Degree and kind of limitation for*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil, which have
column of this table. Gullied land (Gu) is omitted from the table,

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Buildings of 3 stories or less (with basement)	County and access roads	Streets and parking lots in subdivisions
Allegheny:					
AgB, AhB	Slight	Moderate: moderate permeability; gently sloping.	Slight	Slight	Moderate: gently sloping.
AgC, AhC	Moderate: sloping	Severe: sloping	Moderate: sloping	Moderate: sloping	Severe: sloping
AgD	Severe: strongly sloping.	Severe: strongly sloping.	Moderate: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.
AgE	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.
Alluvial land: AlF.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding; strongly sloping to moderately steep.
Bonnie: Bn	Severe: seasonal high water table; subject to flooding.	Severe: subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.
Brookside: BoF.	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep
Bruno: Bu	Severe: subject to flooding.	Severe: subject to flooding; rapid permeability.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.
Caneyville:					
CaD	Severe: limestone rock at depth of 20 to 40 inches; slow permeability.	Severe: limestone rock at depth of 20 to 40 inches; sloping or strongly sloping.	Severe: limestone rock at depth of 20 to 40 inches.	Severe: limestone rock at depth of 20 to 40 inches; sloping or strongly sloping.	Severe: limestone rock at depth of 20 to 40 inches; sloping or strongly sloping.
CeE	Severe: limestone rock at depth of 20 to 40 inches; slow permeability; moderately steep; some rock outcrops.	Severe: limestone rock at depth of 20 to 40 inches; moderately steep.	Severe: limestone rock at depth of 20 to 40 inches; some rock outcrops; moderately steep.	Severe: limestone rock at depth of 20 to 40 inches; moderately steep; some rock outcrops.	Severe: limestone rock at depth of 20 to 40 inches; moderately steep; some rock out crops.
Captina:					
CmB	Severe: slow permeability; fragipan.	Moderate: gently sloping.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; gently sloping.
CmC	Severe: slow permeability; fragipan.	Severe: sloping	Moderate: seasonal high water table; sloping.	Moderate: seasonal high water table; sloping.	Severe: sloping
Clifty: Cn	Severe: subject to flooding.	Severe: subject to flooding; moderately rapid permeability.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.

stated uses in town and country planning

different interpretations. For this reason, the reader should follow carefully the instructions for referring to another series in the first because this mapping unit has severe limitations to all stated uses]

Intensively used				Golf fairways, lawns, and landscaping	Cemeteries	Paths and trails
Campsites for—		Athletic fields	Picnic and play areas			
Tents	Trailers					
Slight	Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Slight	Slight.
Moderate: sloping.	Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Moderate: strongly sloping.
Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.
Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding; strongly sloping to moderately steep.	Severe: subject to flooding.	Moderate: strongly sloping to moderately steep.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table.
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep.
Moderate: subject to flooding; sandy surface layer.	Moderate: subject to flooding; sandy surface layer.	Severe: subject to flooding; sandy surface layer; some sloping and strongly sloping areas.	Moderate: subject to flooding; sandy surface layer.	Severe: sandy surface layer.	Severe: subject to flooding.	Moderate: subject to flooding; sandy surface layer.
Severe: sloping or strongly sloping.	Severe: sloping or strongly sloping.	Severe: limestone rock at depth of 20 to 40 inches: sloping or strongly sloping.	Severe: sloping or strongly sloping.	Severe: sloping or strongly sloping.	Severe: limestone rock at depth of 20 to 40 inches; sloping or strongly sloping.	Moderate: sloping or strongly sloping.
Severe: moderately steep.	Severe: moderately steep.	Severe: limestone rock at depth of 20 to 40 inches; moderately steep; some rock outcrops.	Severe: moderately steep.	Severe: moderately steep; some rock outcrops.	Severe: limestone rock at depth of 20 to 40 inches; moderately steep; some rock outcrops.	Severe: moderately steep.
Moderate: slow permeability.	Moderate: slow permeability.	Severe: slow permeability; fragipan.	Slight	Slight	Severe: slow permeability; fragipan.	Slight.
Moderate: slow permeability.	Moderate: slow permeability; sloping.	Severe: slow permeability; fragipan; sloping.	Moderate: sloping.	Moderate: sloping.	Severe: slow permeability; fragipan; sloping.	Slight.
Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Severe: subject to flooding.	Slight.

TABLE 6.—*Degree and kind of limitation for*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Buildings of 3 stories or less (with basement)	County and access roads	Streets and parking lots in subdivisions
Colyer:					
CoD	Severe: shale rock at depth of 8 to 20 inches.	Severe: shale rock at depth of 8 to 20 inches.	Severe: shale rock at depth of 8 to 20 inches.	Severe: sloping or strongly sloping.	Severe: sloping or strongly sloping.
CrF	Severe: shale rock at depth of 8 to 20 inches; steep.	Severe: shale rock at depth of 8 to 20 inches; steep.	Severe: shale rock at depth of 8 to 20 inches; steep.	Severe: steep	Severe: steep
Cruze:					
CsB	Severe: moderately slow permeability.	Moderate: gently sloping.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
CsC	Severe: moderately slow permeability.	Severe: sloping	Moderate: seasonal high water table; sloping.	Moderate: seasonal high water table; sloping.	Severe: sloping
Cuba: Cu	Severe: subject to flooding; sloping in some areas.	Severe: subject to flooding; sloping in some areas.	Severe: subject to flooding; sloping in some areas.	Severe: subject to flooding.	Severe: subject to flooding.
*Dekalb:					
DrC	Severe: sandstone rock at depth of 20 to 40 inches.	Severe: moderately rapid permeability.	Severe: sandstone rock at depth of 20 to 40 inches.	Severe: sandstone rock at depth of 20 to 40 inches.	Severe: sloping; sandstone rock at depth of 20 to 40 inches.
DrD For Ramsey part of DrC and DrD, see Ramsey series.	Severe: strongly sloping; sandstone rock at depth of 20 to 40 inches.	Severe: moderately rapid permeability; strongly sloping.	Severe: sandstone rock at depth of 20 to 40 inches.	Severe: strongly sloping; sandstone rock at depth of 20 to 40 inches.	Severe: strongly sloping; sandstone rock at depth of 20 to 40 inches.
Elk:					
ElA	Slight	Moderate: moderate permeability.	Slight	Slight	Slight
ElB	Slight	Moderate: moderate permeability; gently sloping.	Slight	Slight	Moderate: gently sloping.
ElC	Moderate: sloping	Severe: sloping	Moderate: sloping	Moderate: sloping:	Severe: sloping
Fairmount: FeE, FeF.	Severe: limestone rock at depth of 10 to 20 inches; moderately slow permeability; strongly sloping to steep; many rock outcrops.	Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep.	Severe: limestone rock at depth of 10 to 20 inches; many rock outcrops; strongly sloping to steep.	Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep; many rock outcrops.	Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep; many rock outcrops.

stated uses in town and country planning—Continued

Intensively used				Golf fairways, lawns, and landscaping	Cemeteries	Paths and trails
Campsites for—		Athletic fields	Picnic and play areas			
Tents	Trailers					
Severe: sloping or strongly sloping.	Severe: sloping or strongly sloping,	Severe: sloping or strongly sloping.	Severe: sloping or strongly sloping.	Severe: sloping or strongly sloping; shale rock at depth of 8 to 20 inches.	Severe: sloping or strongly sloping; shale rock at depth of 8 to 20 inches.	Moderate: sloping or strongly sloping.
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep; shale rock at depth of 8 to 20 inches.	Severe: steep	Severe: steep.
Slight	Moderate: gently sloping.	Moderate: gently sloping; seasonal high water table; moderately slow permeability.	Slight	Slight	Moderate: seasonal high water table; moderately slow permeability.	Slight.
Moderate: sloping.	Severe: sloping.	Severe: sloping.	Moderate: sloping.	Moderate: sloping.	Moderate: seasonal high water table; moderately slow permeability; sloping.	Slight.
Moderate: subject to flooding; sloping in some areas.	Moderate: subject to flooding; sloping in some areas.	Moderate: subject to flooding; sloping in some areas	Moderate: subject to flooding; sloping in some areas.	Moderate: subject to flooding; sloping in some areas.	Severe: subject to flooding.	Moderate: subject to flooding.
Moderate: sloping.	Severe: sloping.	Severe: sloping.	Moderate: sloping.	Moderate: sloping.	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; sandstone rock at depth of 20 to 40 inches.	Moderate: strongly sloping.
Slight	Slight	Slight	Slight	Slight	Slight	Slight.
Slight	Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Slight	Slight.
Moderate: sloping.	Severe: sloping.	Severe: sloping.	Moderate: sloping.	Moderate: sloping.	Moderate: sloping.	Slight.
Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep.	Severe: strongly sloping to to steep.	Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep; many rock outcrops.	Severe: strongly sloping to to steep.	Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep; many rock outcrops.	Severe: limestone rock at depth of 10 to 20 inches; strongly sloping to steep; many rock outcrops.	Moderate: clayey surface layer. Severe where slopes are steep.

TABLE 6.—*Degree and kind of limitation for*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Buildings of 3 stories or less (with basement)	County and access roads	Streets and parking lots in subdivisions
Gilpin: GIC	Severe: sandstone rock at depth of 20 to 40 inches.	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Severe: sloping; sandstone rock at depth of 20 to 40 inches.
GID, GID3	Severe: sandstone rock at depth of 20 to 40 inches; strongly sloping.	Severe: sandstone rock at depth of 20 to 40 inches; strongly sloping.	Severe: sandstone rock at depth of 20 to 40 inches; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.
GIE	Severe: sandstone rock at depth of 20 to 40 inches; moderately steep.	Severe: sandstone rock at depth of 20 to 40 inches; moderately steep.	Severe: moderately steep; sandstone rock at depth of 20 to 40 inches.	Severe: moderately steep.	Severe: moderately steep.
Hartsells: HeC	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Severe: moderately rapid permeability; sloping.	Severe: sandstone rock at depth of 20 to 40 inches.	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Severe: sloping; sandstone rock at depth of 20 to 40 inches.
Huntington: Hu	Severe: subject to flooding; sloping in some areas.	Severe: subject to flooding.	Severe: subject to flooding; sloping in some areas.	Severe: subject to flooding.	Severe: subject to flooding.
Jefferson. Mapped only with Shelocta soils.	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep
Lanton: LaA	Severe: seasonal high water table; flooding.	Severe: flooding	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
*Latham: LbC	Severe: slow permeability.	Severe: sloping	Severe: moderate to high shrink-swell potential.	Severe: low traffic-supporting capacity.	Severe: low traffic-supporting capacity; sloping.
LbD	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Severe: moderate to high shrink-swell potential.	Severe: low traffic-supporting capacity; strongly sloping.	Severe: low traffic-supporting capcity; strongly sloping.
LcE, LcF. For Shelocta part of LcE and LcF, see Shelocta series.	Severe: slow permeability; moderately steep or steep.	Severe: moderately steep or steep.	Severe: moderate to high shrink-swell potential; moderately steep or steep.	Severe: low traffic-supporting capacity; moderately steep or steep.	Severe: low traffic-supporting capacity; moderately steep or steep.

stated uses in town and country planning—Continued

Intensively used				Golf fairways, lawns, and landscaping	Cemeteries	Paths and trails
Campsites for—		Athletic fields	Picnic and play areas			
Tents	Trailers					
Moderate: sloping.	Severe: sloping.	Severe: sandstone rock at depth of 20 to 40 inches; sloping	Moderate: sloping.	Moderate: sandstone rock at depth of 20 to 40 inches; sloping.	Severe: sandstone rock at depth of 20 to 40 inches; sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; sandstone rock at depth of 20 to 40 inches.	Moderate: strongly sloping; GID3 is severely eroded.
Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep.	Severe: moderately steep; sandstone rock at depth of 20 to 40 inches.	Severe: moderately steep.
Moderate: sloping.	Severe: sloping.	Severe: sloping; sandstone rock at depth of 20 to 40 inches.	Moderate: sloping.	Moderate: sloping.	Severe: sloping; sandstone rock at depth of 20 to 40 inches.	Slight.
Severe: subject to flooding; sloping in some areas.	Severe: subject to flooding; sloping in some areas.	Moderate: subject to flooding; sloping in some areas.	Moderate: subject to flooding.	Moderate: subject to flooding; sloping in some areas.	Severe: subject to flooding; sloping in some areas	Moderate: subject to flooding.
Severe: steep---	Severe: steep---	Severe: steep---	Severe: steep---	Severe: steep---	Severe: steep---	Severe: steep.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table.
Severe: slow permeability.	Severe: slow permeability; sloping.	Severe: slow permeability; sloping.	Moderate: sloping.	Moderate: sloping.	Severe: slow permeability; shale at depth of 20 to 40 inches.	Slight.
Severe: slow permeability; strongly sloping.	Severe: slow permeability; strongly sloping.	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping; slow permeability; shale at depth of 20 to 40 inches.	Moderate: strongly sloping.
Severe: slow permeability; moderately steep or steep.	Severe: moderately steep or steep.	Severe: moderately steep or steep.	Severe: moderately steep or steep.	Severe: moderately steep or steep.	Severe: moderately steep or steep.	Severe: moderately steep or steep.

TABLE 6.—*Degree and kind of limitation for*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Buildings of 3 stories or less (with basement)	County and access roads	Streets and parking lots in subdivisions
Lindside: Ld	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Melvin: Me	Severe: seasonal high water table; flooding.	Severe: flooding	Severe: flooding; seasonal high water table.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.
Monongahela: MoB.	Severe: slow permeability; fragipan.	Moderate: gently sloping.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table; gently sloping.
Morehead: Mr	Severe: seasonal high water table.	Slight	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.
Muse: MsC	Severe: moderately slow permeability.	Severe: sloping	Moderate: moderate shrink-swell potential; sloping.	Severe: low traffic-supporting capacity.	Severe: low traffic-supporting capacity; sloping.
MsD	Severe: slow permeability; strongly sloping.	Severe: strongly sloping.	Severe: moderate shrink-swell potential; strongly sloping.	Severe: low traffic-supporting capacity; strongly sloping.	Severe: low traffic-supporting capacity; strongly sloping.
Newark: Ne	Severe: seasonal high water table; flooding.	Severe: flooding	Severe: seasonal high water table; flooding.	Severe: flooding	Severe: flooding
Pope: Po	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding
Purdy: Pu	Severe: seasonal high water table; moderately slow permeability.	Slight	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Ramsey. Mapped only with Dekalb soils.	Severe: sandstone rock at depth of 10 to 20 inches; strongly sloping in some areas.	Severe: sandstone rock at depth of 10 to 20 inches; rapid permeability; sloping or strongly sloping.	Severe: sandstone rock at depth of 10 to 20 inches.	Severe: sandstone rock at depth of 10 to 20 inches; strongly sloping in some areas.	Severe: sandstone rock at depth of 10 to 20 inches; sloping or strongly sloping.
*Shelocta: SeB	Slight	Moderate: moderate permeability; gently sloping.	Slight	Slight	Moderate: gently sloping.
SeC	Moderate: sloping	Severe: sloping	Moderate: sloping	Moderate: sloping	Severe: sloping
SeD	Severe: strongly sloping.	Severe: strongly sloping.	Moderate: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.

stated uses in town and country planning—Continued

Intensively used				Golf fairways, lawns, and landscaping	Cemeteries	Paths and trails
Campsites for—		Athletic fields	Picnic and play areas			
Tents	Trailers					
Severe: flooding.	Severe: flooding.	Moderate: flooding; seasonal high water table at depth of 2½ to 3 feet.	Moderate: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Severe: flooding; seasonal high water table.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; flooding.	Severe: seasonal high high water table.
Moderate: slow permeability; fragipan.	Moderate: slow permeability; fragipan.	Severe: slow permeability; fragipan.	Slight	Slight	Severe: slow permeability; fragpan.	Slight.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table.
Moderate: moderately slow permeability; sloping.	Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: moderately slow permeability; sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Moderate: strongly sloping.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.	Severe: seasonal high water table.	Moderate: seasonal high water table; flooding.
Moderate: flooding.	Moderate: flooding; sloping in some areas.	Moderate: flooding; sloping in some areas.	Moderate: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Severe: sandstone rock at depth of 10 to 20 inches; strongly sloping in some areas.	Severe: sandstone rock at depth of 10 to 20 inches; sloping or strongly sloping.	Severe: sandstone rock at depth of 10 to 20 inches; sloping or strongly sloping.	Severe: sandstone rock at depth of 10 to 20 inches; strongly sloping in some areas.	Severe: sandstone rock at depth of 10 to 20 inches; strongly sloping in some areas.	Severe: sandstone rock at depth of 10 to 20 inches; strongly sloping in some areas.	Slight; moderate where soil is strongly sloping.
Slight	Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Slight	Slight.
Moderate: sloping.	Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Moderate: strongly sloping.

TABLE 6.—*Degree and kind of limitation for*

Soil series and map symbols	Sewage effluent disposal	Sewage lagoons	Buildings of 3 stories or less (with basement)	County and access roads	Streets and parking lots in subdivisions
SlF, SoF----- For Jefferson part of SoF, see Jefferson series.	Severe: steep-----	Severe: steep-----	Severe: steep-----	Severe: steep-----	Severe: steep-----
Shrouts: SrE, SsE3-----	Severe: slow permeability; strongly sloping to steep.	Severe: strongly sloping to steep.	Severe: high shrink-swell potential; poor stability.	Severe: strongly sloping to steep.	Severe: strongly sloping to steep.
Stendal: St, Su---	Severe: seasonal high water table; flooding.	Severe: flooding; moderate permeability.	Severe: seasonal high water table; flooding.	Severe: flooding----	Severe: flooding----
Trappist: TrB----------	Severe: moderately slow permeability; black shale at depth of 20 to 40 inches.	Severe: black shale at depth of 20 to 40 inches.	Severe: black shale at depth of 20 to 40 inches; moderate shrink-swell potential.	Severe: black shale at depth of 20 to 40 inches; moderate shrink-swell potential.	Severe: black shale at depth of 20 to 40 inches; gently sloping.
TrC----------	Severe: moderately slow permeability; black shale at depth of 20 to 40 inches; sloping.	Severe: black shale at depth of 20 to 40 inches; sloping.	Severe: black shale at depth of 20 to 40 inches; moderate shrink-swell potential; sloping.	Severe: black shale at depth of 20 to 40 inches; moderate shrink-swell potential; sloping.	Severe: black shale at depth of 20 to 40 inches; sloping.
Whitley: WhB----------	Moderate: bedrock at depth of 3½ to 5 feet.	Moderate: slope; moderate permeability.	Moderate: bedrock at depth of 3½ to 5 feet.	Moderate: bedrock at depth of 3½ to 5 feet.	Moderate: gently sloping.
WhC----------	Moderate: bedrock at depth of 3½ to 5 feet; sloping.	Severe: sloping-----	Moderate: bedrock at depth of 3½ to 5 feet; sloping.	Moderate: bedrock at depth of 3½ to 5 feet; sloping.	Severe: sloping-----
WhD----------	Severe: strongly sloping.	Severe: strongly sloping.	Moderate: bedrock at depth of 3½ to 5 feet; strongly sloping.	Severe: bedrock at depth of 3½ to 5 feet; strongly sloping.	Severe: strongly sloping.
Woolper: WoC----	Severe: moderately slow permeability.	Severe: sloping-----	Moderate: moderate shrink-swell potential; sloping.	Severe: moderate shrink-swell potential; sloping.	Severe: moderate shrink-swell potential; sloping.

stated uses in town and country planning—Continued

Intensively used				Golf fairways, lawns, and landscaping	Cemeteries	Paths and trails
Campsites for—		Athletic fields	Picnic and play areas			
Tents	Trailers					
Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep	Severe: steep.
Severe: strongly sloping to steep; SsE3 has clay surface layer.	Severe: strongly sloping to steep; SsE3 has clay surface layer.	Severe: slow permeability; strongly sloping to steep; SsE3 has clay surface layer.	Severe: strongly sloping to steep; SsE3 has clay surface layer.	Severe: strongly sloping to steep; SsE3 has clay surface layer.	Severe: slow permeability; strongly sloping to steep; SsE3 has clay surface layer.	Moderate: strongly sloping to steep; SsE3 has clay surface layer.
Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table; flooding.	Moderate: seasonal high water table; flooding.	Severe: seasonal high water table.	Moderate: seasonal high water table; flooding.
Moderate: moderately slow permeability.	Moderate: moderately slow permeability; gently sloping.	Moderate: black shale at depth of 20 to 40 inches; moderately slow permeability; gently sloping.	Slight	Moderate: black shale at depth of 20 to 40 inches.	Severe: black shale at depth of 20 to 40 inches; gently sloping.	Slight.
Moderate: moderately slow permeability; sloping.	Severe: sloping	Severe: black shale at depth of 20 to 40 inches; moderately slow permeability; sloping.	Moderate: sloping.	Moderate: black shale at depth of 20 to 40 inches; sloping.	Severe: black shale at depth of 20 to 40 inches; sloping.	Slight.
Slight	Moderate: gently sloping.	Moderate: gently sloping.	Slight	Slight	Moderate: bedrock at depth of 3½ to 5 feet.	Slight.
Moderate: sloping.	Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: bedrock at depth of 3½ to 5 feet; sloping.	Slight.
Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: strongly sloping.	Severe: bedrock at depth of 3½ to 5 feet; strongly sloping.	Moderate: strongly sloping.
Moderate: moderately slow permeability; sloping.	Severe: sloping	Severe: sloping	Moderate: sloping.	Moderate: sloping.	Moderate: moderately slow permeability; sloping.	Slight.

to south exposures but are not significant enough to have affected soil development much.

Plant and animal life

Plants, animals, insects, bacteria, and fungi are important in soil formation. Organic matter, loss of plant nutrients, and structure are affected by living organisms.

Most soils in Estill and Lee Counties formed under hardwood forest and have a light-colored surface layer low in organic-matter content. Huntington and Lanton soils are exceptions. The Huntington soil has a dark-colored surface layer 15 inches thick that is the result of organic-matter accumulation. The Lanton soil formed under partial swamp vegetation and has a dark-colored surface layer 10 inches thick.

Time

The length of time the soil-forming processes have been taking place is reflected in the degree of development of the soil profile. A young soil has very little profile development, and an old soil has well-expressed soil horizons.

The Huntington soil, which formed in alluvium on flood plains, is a young soil. Except for accumulation of organic matter in the surface layer, it retains most of the characteristics of the alluvial parent material. The Whitley soils formed in parent material weathered from underlying rock and are old soils that have distinct soil horizons.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation (*6*). First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*16*). The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available (*14*, *18*). In table 7 the soil series of Estill and Lee Counties are placed in some categories of the current system and in the great soil groups of the older system.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable or measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The first five categories in the current system are briefly defined in the following paragraphs.

Order.—Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol). Five orders are represented in the survey area. They are Alfisols, Entisols, Inceptisols, Mollisols, and Ultisols.

Suborder.—Each order is divided into suborders that are based primarily on those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is Aquent (*Aqu*, meaning water or wet, and *ent* from Entisol). The suborder is not shown in table 7, because it is indicated in the last word of the subgroup name.

Great group.—Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the suborder. An example is Haplaquents (*Hapl*, meaning simple horizons, *aqu* for wetness or water, and *ent*, from Entisols. The great group is not shown separately in table 7 because it is the last word in the name of the subgroup.

Subgroup.—Each great group is divided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Haplaquents (a typical Haplaquent).

Family.—Soil families are established within a subgroup primarily on the basis of properties important to the growth of plants or the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, consistence, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding

TABLE 7.—*Classification of soil series by higher categories*

Series	Family	Subgroup	Order	Great soil group (1938 classification)
Allegheny	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Bonnie	Fine-silty, mixed, acid, mesic	Typic Fluvaquents	Entisols	Low-Humic Gley soils intergrading toward Alluvial soils.
Brookside	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Bruno [1]	Sandy, mixed, thermic	Typic Udifluvents	Entisols	Alluvial soils.
Caneyville	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Red-Yellow Podzolic soils.
Captina	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Clifty	Fine-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Colyer	Clayey-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Cruze	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Cuba	Fine-silty, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Dekalb	Loamy-skeletal, mixed, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Elk	Fine-silty, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Fairmount	Clayey, mixed, mesic, shallow	Typic Hapludolls	Mollisols	Rendzina soils.
Gilpin	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Hartsells [1]	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Huntington	Fine-silty, mixed, mesic	Fluventic Hapludolls	Mollisols	Alluvial soils.
Jefferson	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Lanton [1]	Fine-silty, mixed, noncalcareous, thermic.	Cumulic Haplaquolls	Mollisols	Humic Gley soils.
Latham	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Lindside	Fine-silty, mixed, mesic	Fluvaquentic Eutrochrepts	Inceptisols	Alluvial soils.
Melvin	Fine-silty, mixed, nonacid, mesic	Typic Fluvaquents	Entisols	Low-Humic Gley soils intergrading toward Alluvial soils.
Monongahela	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils.
Morehead	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols	Low-Humic Gley soils.
Muse	Clayey, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Newark	Fine-silty, mixed, nonacid, mesic	Aeric Fluvaquents	Entisols	Alluvial soils.
Pope [2]	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Purdy	Clayey, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Ramsey	Loamy, siliceous, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Shelocta	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Shrouts	Fine, mixed, mesic	Aquic Hapludalfs	Alfisols	Solonetz soils.
Stendal [3]	Fine-silty, mixed, acid, mesic	Aeric Fluvaquents	Entisols	Alluvial soils.
Trappist	Clayey, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Whitley	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Woolper	Fine, mixed, mesic	Typic Argiudolls	Mollisols	Gray-Brown Podzolic soils.

[1] These soils are taxadjuncts to the series because the temperature is a few degrees lower than is defined in the range for the series.

[2] Pope soils in Estill and Lee Counties are taxadjuncts to the series because they contain more clay in the subsoil than is defined in the range for the series.

[3] Stendal gravelly loam in Estill and Lee Counties is a taxadjunct. It has a greater coarse fragment content than is defined in the range for the series.

the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae (see table 7). An example is the fine-loamy, siliceous, thermic family of Typic Hapludults.

General Nature of the Area

This section provides general information about the development of Estill and Lee Counties and about the physiography, drainage, and climate. It also gives facts about farming. Unless otherwise stated, statistics related to farming are from records of the U.S. Bureau of the Census.

Estill County was established in 1808 from parts of Madison and Clark Counties. It was named in honor of Capt. James Estill. Part of Estill County's original territory has since been taken to form Breathitt, Owsley, Powell, Jackson, and Lee Counties. Irvine, the county seat, was established in 1812. The population of Estill County was 14,677 in 1950 and 12,466 in 1960.

Lee County was established in 1870 from parts of Breathitt, Estill, Owsley, and Wolfe Counties. It was named in honor of Robert E. Lee. Beattyville is the county seat. The population of Lee County was 8,739 in 1950 and 7,420 in 1960.

The main economy of Estill and Lee Counties is based on farming and on oil (fig. 17) and wood products. Petroleum and limestone are the main mineral resources. Lee County contains some deposits of coal, and the coal has been mined to some extent. The Red River Iron District was mainly confined to Estill County, and in 1871 nearly 10,000 tons of pig iron was produced. This industry, however, has long been out of existence. About 75 percent of Estill and Lee Counties is wooded, and logging and other forest products are a major source of income (fig. 18). Several sawmills are in operation in both counties.

With increased industrial and commercial growth of Irvine, Beattyville, and other towns in the surrounding counties, many farms are operated on a part-time basis. Forty-six percent of the farmers in Estill County and nearly 40 percent of those in Lee County are working at jobs off the farm.

Physiography and Drainage

The physiographic areas of Estill and Lee Counties are the Mountains, Knobs, and Outer Bluegrass.

The Mountain area is the most extensive and includes all of Lee County and the southern and eastern half of

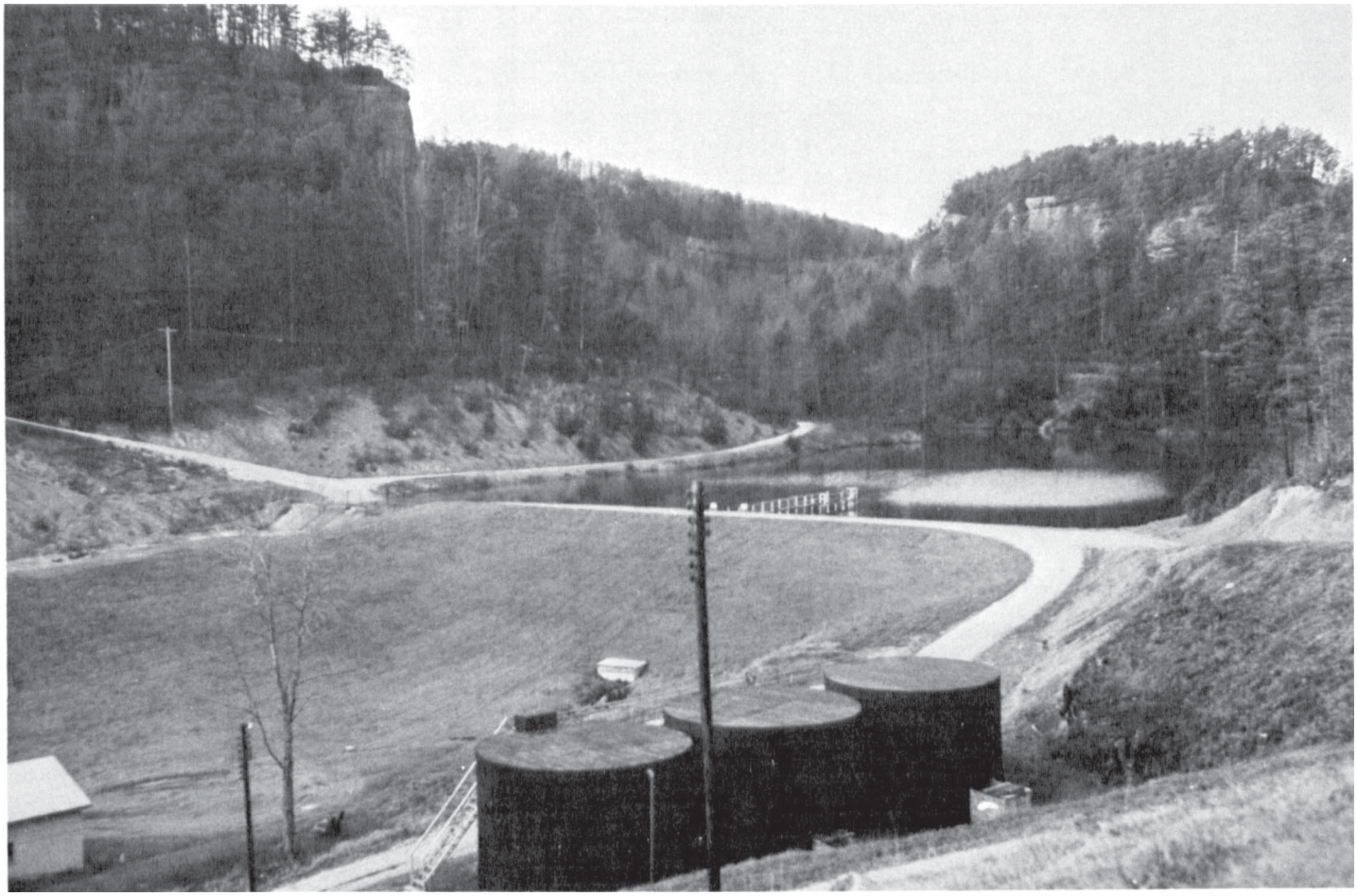

Figure 17.—Chemical-treatment and water-flooding plant used for oil recovery in Lee County.

Figure 18.—Processing locally cut logs at a sawmill in St. Helens, Lee County.

Estill County. The topography ranges from mountainous to hilly. It is an area of narrow flood plains; long, steep mountainsides; and long, narrow ridgetops or upper slopes. The soils of this area are underlain mostly by Mississippian and Pennsylvanian shale, siltstone, and sandstone (*20*).

The Knobs area extends from Irvine to the Madison County line and north to the Clark County line. The topography is hilly. This is an area of narrow ridgetops, hillsides, and narrow flood plains. The soils of this area are underlain by Devonian black shale and Silurian calcareous shale (*20*).

The Outer Bluegrass is a small, narrow area along the northwestern edge of Estill County next to the Kentucky River. The topography is hilly. This is an area of long, narrow ridgetops between deep, V-shaped valleys. The soils of this area are underlain by lower Silurian and Ordovician limestone and shaly limestone (*20*).

The Kentucky River winds through all these areas. Some fairly large flood plains are along the river, its forks, and major tributary creeks. Soils in these areas are nearly level and are used mostly for crops.

All of Estill and Lee Counties is in the Kentucky River watershed, and all surface drainage flows to the Kentucky River. In Estill County the main tributary streams are Station Camp, Red Lick, Crooked, Clear, and Drowning Creeks, which flow northward or northeastward. Along the northern edge of Estill County, drainage flows northward into Red River and thus to the Kentucky River. Miller, Cow, and White Oak Creeks flow southward into the Kentucky River. In the eastern half of Lee County, all drainage flows to the North, Middle, and South Forks of the Kentucky River. In the western half of the county, Sturgeon and Ross Creeks are the main tributaries flowing northward, and Sinking Creek flows southward into Millers Creek and thus to the Kentucky River.

Climate [5]

The climate of Estill and Lee Counties is temperate and is favorable for many types of plants and animals. Generally, summers are warm and humid and winters are moderately cold. Precipitation is well distributed throughout the year. The average length of the growing season is about 175 days. Temperature and precipitation data are shown in table 8, and probabilities of freezing

[5] A. B. Elam, Jr., climatologist for Kentucky, National Weather Service, U.S. Department of Commerce, helped to prepare this section.

temperatures in spring and fall are shown in table 9. At times, temperatures in the hilly areas of the counties differ from those recorded at Lock No. 14. Lower temperatures can occur near the ground in areas subject to air drainage. For this reason, valleys can have lower temperatures than the surrounding hills when cooler, heavier air drains to areas of lower elevations.

Winter and early spring are the recharge seasons, and most soils are saturated with water early in spring. During years of average rainfall, adequate moisture is available for crops. Dry periods are most common late in summer and in fall. There is a 10 percent chance that less than 1 inch of rain will fall in September or October. Pastures and late-maturing crops can be severely damaged by dry weather at this time of year. There is a 10 percent chance that less than 2.3 inches of rain will fall in any summer month. High temperature combined with low precipitation damage most crops, and the effects are most severe on shallow soils. Poorly drained soils are severely affected by wetness during periods of above-average precipitation. There is a 10 percent chance that 6 inches or more of rain will fall in any month of spring or summer. If this occurs, spring planting is delayed and crops are damaged on the poorly drained, nearly level soils.

TABLE 8.—*Temperature and precipitation, Estill and Lee Counties, Ky.*

[Data recorded at Heidelberg Lock No. 14, Lee County, Ky., 1938–67, except as indicated]

Month	Temperature					Precipitation			
	Average daily maximum	Average daily minimum	Average maximum	Average minimum	Average total	One year in 10 will have—		Days with 1 inch or more of snow on ground	Average depth of snow on days that have snow cover
						Less than [1]—	More than [1]—		
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	47	25	68	0	4.0	1.8	7.6	5	3
February	51	27	69	4	4.1	1.5	8.0	4	3
March	60	33	79	14	4.8	2.3	7.6	1	5
April	71	42	87	25	3.7	1.8	5.9	[2]	1
May	79	51	90	35	3.9	1.8	6.0	0	0
June	85	60	94	46	4.5	2.0	7.5	0	0
July	88	63	95	52	5.6	2.3	9.2	0	0
August	87	62	94	50	3.7	1.4	7.3	0	0
September	82	55	92	39	2.8	0.8	5.1	0	0
October	72	43	85	26	1.9	0.6	3.3	0	0
November	59	33	77	16	3.5	1.3	6.0	1	3
December	49	27	68	5	3.3	1.3	5.9	3	3
Year	69	43	[3] 96	[4] −5	45.8	38.0	54.0	14	3

[1] Estimates based on data obtained from Ravenna (Estill County) and Heidelberg (Lee County) and nearby locations.
[2] Less than 0.5 day.
[3] Average annual maximum.
[4] Average annual minimum.

TABLE 9.—*Probabilities of last freezing temperature in spring and first in fall*

[Data recorded at Heidelberg Lock No. 14, Lee County, Ky., in a standard U.S. Weather Service shelter at a height of about 5 feet above the ground and at an elevation of 663 feet above mean sea level]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 27	April 1	April 12	April 26	May 8.
2 years in 10 later than	March 19	March 25	April 6	April 20	May 3.
5 years in 10 later than	March 5	March 13	March 25	April 9	April 23.
Fall:					
1 year in 10 earlier than	November 17	November 9	October 23	October 14	October 3.
2 years in 10 earlier than	November 22	November 15	October 29	October 20	October 8.
5 years in 10 earlier than	December 2	November 25	November 8	October 29	October 18.

Farming

Farming is limited in Estill and Lee Counties, because about 70 percent of Estill County is wooded and about 80 percent of Lee County is wooded. In 1969 Estill County had a total of 655 farms, of an average size of 126 acres; and Lee County had a total of 454 farms, of an average size of 84 acres. Tobacco, corn, and hay are the main crops, and beef cattle and hogs are the main livestock of the area. In 1969, 481 acres of tobacco were grown in Estill County, and 235 acres in Lee County. About 2,000 acres of corn and 4,000 acres of hay were grown in Estill County, and about 500 acres of corn and 1,000 acres of hay were grown in Lee County. In the same year, about 8,300 head of cattle and 2,700 hogs were reported in Estill County, and about 1,700 head of cattle and 600 hogs were reported in Lee County. A few dairies are operated, and some poultry is raised. Woodland products are a major source of income for many farms.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uni-

form color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts, and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky scructure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residual material. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

Root zone. The part of the soil that is penetrated, or can be penetrated, by plant roots.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slope gradient. Terms used in this survey to describe the range of slopes are *nearly level,* 0 to 2 percent; *gently sloping,* 2 to 6 percent; *sloping,* 6 to 12 percent; *strongly sloping,* 12 to 20 percent; *moderately steep,* 20 to 30 percent; *steep,* 30 to 50 percent; and *very steep,* more than 40 percent.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth. Terms used in this survey to describe the range of soil depth are *shallow,* 10 to 20 inches to an "R" layer; *moderately deep,* 20 to 40 inches to an "R" layer; and *deep,* 40 inches or more over an "R" layer.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equiv-

alent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Variegation. Contrasting color patches that vary in number and size; assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE

KENTUCKY AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

ESTILL AND LEE COUNTIES, KENTUCKY

Scale 1:190,080

1 0 1 2 3 4 Miles

SOIL ASSOCIATIONS

1 — Fairmount-Shrouts-Allegheny association: Strongly sloping to steep, shallow and deep, well-drained soils on sides of deep, V-shaped valleys; and gently sloping to strongly sloping, well-drained soils mostly on long, narrow ridgetops

2 — Colyer-Shrouts-Allegheny association: Sloping to steep, shallow and moderately deep, well-drained and excessively drained soils on the sides and tops of very narrow ridges; and gently sloping to strongly sloping, deep, well-drained soils mostly on long, narrow ridges

3 — Huntington-Newark-Morehead association: Nearly level, well-drained and somewhat poorly drained soils on flood plains and terraces of the Kentucky River and its larger tributaries

4 — Shelocta-Brookside-Latham association: Mostly steep, deep, well-drained soils on mountains; and sloping to moderately steep, deep, well drained and moderately well drained soils on ridge crests

5 — Shelocta-Jefferson-Dekalb association: Steep, deep, well-drained soils on mountains; and sloping to strongly sloping, moderately deep, well-drained soils on narrow ridgetops

6 — Shelocta-Latham-Jefferson association: Steep and moderately steep, deep, well-drained soils on mountains; and sloping to steep, deep, moderately well drained to well drained soils on long, narrow ridgetops

7 — Latham-Shelocta-Gilpin association: Sloping to steep, deep and moderately deep, moderately well drained to well drained soils on the sides and tops of ridges; and dominantly steep, deep, well-drained soils in colluvial areas

Compiled 1972

N

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. In referring to a capability unit, read the introduction to the section it is in for general information about its management. Woodland groups are described on pages 47 through 50. Other information is given in tables as follows:

Acreage and extent, table 1, page 10.
Estimated yields, table 2, page 44.

Engineering uses of the soils, tables 4 and 5, pages 56 through 67.
Town and country planning, table 6, page 70.

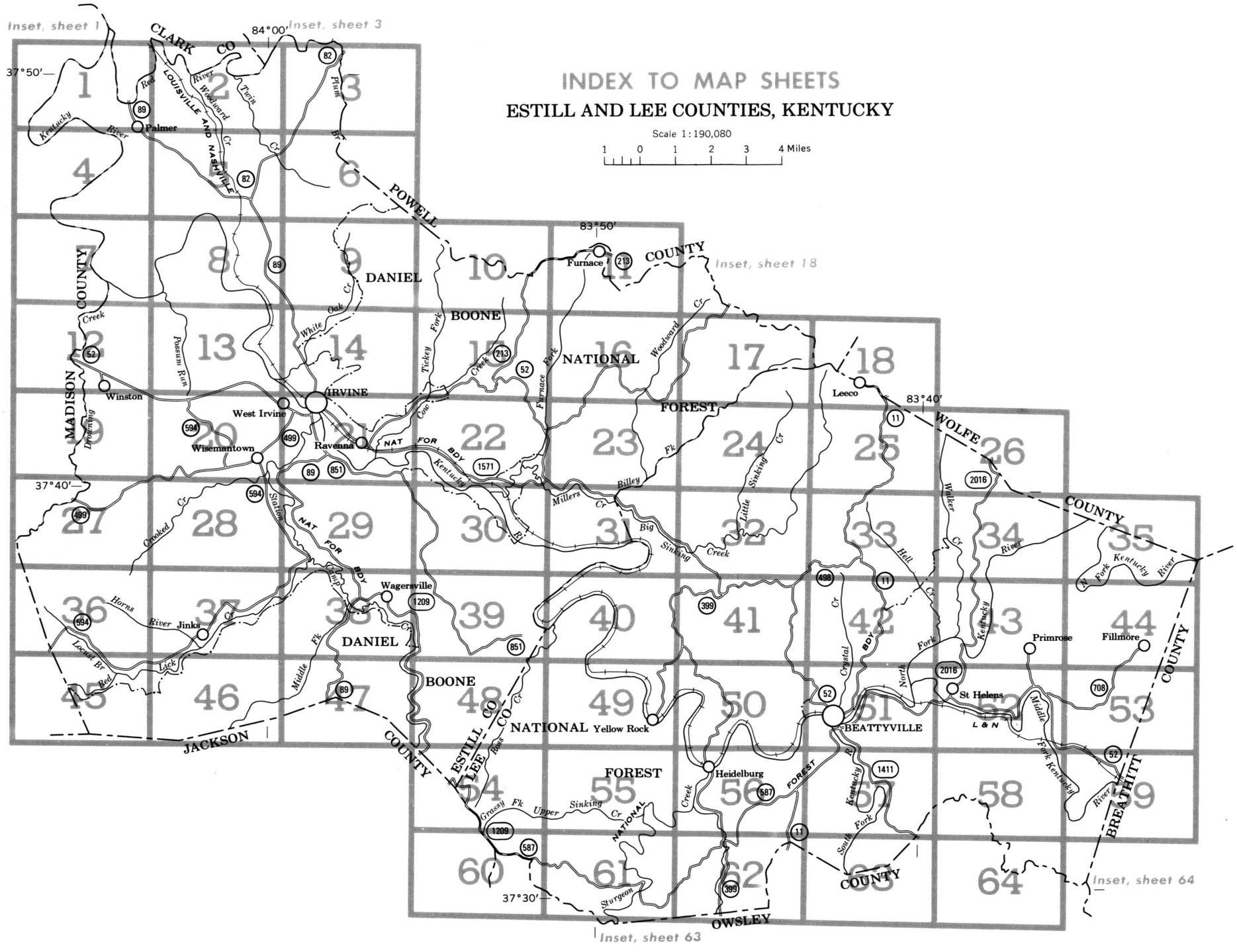
Map symbol	Mapping unit	Described on page	Capability unit		Woodland group
			Symbol	Page	Symbol
AgB	Allegheny loam, 2 to 6 percent slopes	10	IIe-4	37	1
AgC	Allegheny loam, 6 to 12 percent slopes	10	IIIe-5	39	1
AgD	Allegheny loam, 12 to 20 percent slopes	10	IVe-1	40	1
AgE	Allegheny loam, 20 to 30 percent slopes	11	VIe-1	41	7
AhB	Allegheny gravelly loam, 2 to 6 percent slopes	11	IIe-4	37	1
AhC	Allegheny gravelly loam, 6 to 12 percent slopes	11	IIIe-5	39	1
AlF	Alluvial land, steep	11	VIs-3	41	8
Bn	Bonnie silt loam	12	IIIw-1	40	10
BoF	Brookside stony silt loam, 30 to 60 percent slopes	12	VIIs-1	42	--
	North and east aspects	--	-----	--	7
	South and west aspects	--	-----	--	3
Bu	Bruno loamy fine sand	13	IIIs-1	40	8
CaD	Caneyville rocky silt loam, 6 to 20 percent slopes	13	VIs-1	41	3
CeE	Caneyville very rocky silt loam, 20 to 30 percent slopes	14	VIIs-1	42	3
CmB	Captina silt loam, 2 to 6 percent slopes	14	IIe-3	37	4
CmC	Captina silt loam, 6 to 12 percent slopes	14	IIIe-4	39	4
Cn	Clifty gravelly silt loam	15	IIs-1	38	8
CoD	Colyer silt loam, 6 to 20 percent slopes	15	VIs-2	41	5
CrF	Colyer shaly silt loam, 20 to 50 percent slopes	16	VIIs-2	43	--
	North and east aspects	--	-----	--	5
	South and west aspects	--	-----	--	6
CsB	Cruze silt loam, 2 to 6 percent slopes	16	IIe-2	37	4
CsC	Cruze silt loam, 6 to 15 percent slopes	16	IIIe-3	39	4
Cu	Cuba silt loam	17	I-1	36	8
DrC	Dekalb-Ramsey-Rock outcrop complex, 6 to 12 percent slopes	17	VIs-1	41	2
DrD	Dekalb-Ramsey-Rock outcrop complex, 12 to 20 percent slopes	17	VIs-1	41	2
ElA	Elk silt loam, 0 to 2 percent slopes	18	I-3	37	1
ElB	Elk silt loam, 2 to 6 percent slopes	18	IIe-1	37	1
ElC	Elk silt loam, 6 to 12 percent slopes	18	IIIe-1	39	1
FeE	Fairmount extremely rocky silty clay loam, 12 to 30 percent slopes	19	VIIs-1	42	5
FeF	Fairmount extremely rocky silty clay loam, 30 to 60 percent slopes	19	VIIs-1	42	5
GlC	Gilpin silt loam, 6 to 12 percent slopes	19	IIIe-6	39	2
GlD	Gilpin silt loam, 12 to 20 percent slopes	19	IVe-3	40	2
GlD3	Gilpin silt loam, 12 to 20 percent slopes, severely eroded	19	VIe-3	41	5
GlE	Gilpin silt loam, 20 to 30 percent slopes	20	VIe-1	41	--
	North and east aspects	--	-----	--	7
	South and west aspects	--	-----	--	2
Gu	Gullied land	20	VIIe-2	42	6
HeC	Hartsells fine sandy loam, 6 to 12 percent slopes	20	IIIe-6	39	1
Hu	Huntington silt loam	21	I-1	36	8
LaA	Lanton silt loam, 0 to 2 percent slopes	22	IIw-2	38	10
LbC	Latham silt loam, 6 to 12 percent slopes	23	IIIe-3	39	3
LbD	Latham silt loam, 12 to 20 percent slopes	23	IVe-3	40	3
LcE	Latham-Shelocta complex, 20 to 30 percent slopes	23	VIe-1	41	7
LcF	Latham-Shelocta complex, 30 to 60 percent slopes	24	VIIe-1	42	7
Ld	Lindside silt loam	24	I-2	36	9
Me	Melvin silt loam	25	IIIw-1	40	10
MoB	Monongahela fine sandy loam, 2 to 6 percent slopes	25	IIe-3	37	4
Mr	Morehead silt loam	26	IIw-3	38	9
MsC	Muse silt loam, 6 to 12 percent slopes	27	IIIe-2	39	3
MsD	Muse silt loam, 12 to 20 percent slopes	27	IVe-2	40	3
Ne	Newark silt loam	27	IIw-1	37	9
Po	Pope loam	28	I-1	36	8
Pu	Purdy silt loam	28	IVw-1	40	10
SeB	Shelocta silt loam, 2 to 6 percent slopes	29	IIe-4	37	1
SeC	Shelocta silt loam, 6 to 12 percent slopes	29	IIIe-5	39	1
SeD	Shelocta silt loam, 12 to 20 percent slopes	30	IVe-1	40	1
SlF	Shelocta gravelly silt loam, 20 to 60 percent slopes	30	VIIe-1	42	7
SoF	Shelocta and Jefferson stony soils, 20 to 60 percent slopes	30	VIIe-1	42	7
SrE	Shrouts silty clay loam, 12 to 30 percent slopes	31	VIe-2	41	5
SsE3	Shrouts clay, 12 to 40 percent slopes, severely eroded	31	VIIe-2	42	6
St	Stendal silt loam	32	IIw-1	37	9
Su	Stendal gravelly silt loam	32	IIw-1	37	9
TrB	Trappist silt loam, 2 to 6 percent slopes	33	IIe-2	37	3
TrC	Trappist silt loam, 6 to 12 percent slopes	33	IIIe-3	39	3
WhB	Whitley silt loam, 2 to 6 percent slopes	33	IIe-1	37	1
WhC	Whitley silt loam, 6 to 12 percent slopes	33	IIIe-1	39	1
WhD	Whitley silt loam, 12 to 20 percent slopes	34	IVe-1	40	1
WoC	Woolper silty clay loam, 6 to 12 percent slopes	35	IIIe-2	39	3

INDEX TO MAP SHEETS

ESTILL AND LEE COUNTIES, KENTUCKY

Scale 1:190,080

1 0 1 2 3 4 Miles



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ESTILL AND LEE COUNTIES, KENTUCKY

U. S. FOREST SERVICE
KENTUCKY AGRICULTURAL EXPERIMENT STATION

SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter, A, B, C, D, E, or F, shows the slope. Most symbols without a slope letter are those of nearly level soils, but some are for land types that have a considerable range of slope. A final number, 3, in the symbol indicates that the soil is severely eroded.

SYMBOL	NAME
AgB	Allegheny loam, 2 to 6 percent slopes
AgC	Allegheny loam, 6 to 12 percent slopes
AgD	Allegheny loam, 12 to 20 percent slopes
AgE	Allegheny loam, 20 to 30 percent slopes
AhB	Allegheny gravelly loam, 2 to 6 percent slopes
AhC	Allegheny gravelly loam, 6 to 12 percent slopes
AlF	Alluvial land, steep
Bn	Bonnie silt loam
BoF	Brookside stony silt loam, 30 to 60 percent slopes
Bu	Bruno loamy fine sand
CaD	Caneyville rocky silt loam, 6 to 20 percent slopes
CeE	Caneyville very rocky silt loam, 20 to 30 percent slopes
CmB	Captina silt loam, 2 to 6 percent slopes
CmC	Captina silt loam, 6 to 12 percent slopes
Cn	Clifty gravelly silt loam
CoD	Colyer silt loam, 6 to 20 percent slopes
CrF	Colyer shaly silt loam, 20 to 50 percent slopes
CsB	Cruze silt loam, 2 to 6 percent slopes
CsC	Cruze silt loam, 6 to 15 percent slopes
Cu	Cuba silt loam
DrC	Dekalb-Ramsey-Rock outcrop complex, 6 to 12 percent slopes
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ElA	Elk silt loam, 0 to 2 percent slopes
ElB	Elk silt loam, 2 to 6 percent slopes
ElC	Elk silt loam, 6 to 12 percent slopes
FeE	Fairmount extremely rocky silty clay loam, 12 to 30 percent slopes
FeF	Fairmount extremely rocky silty clay loam, 30 to 60 percent slopes
GlC	Gilpin silt loam, 6 to 12 percent slopes
GlD	Gilpin silt loam, 12 to 20 percent slopes
GlD3	Gilpin silt loam, 12 to 20 percent slopes, severely eroded
GlE	Gilpin silt loam, 20 to 30 percent slopes
Gu	Gullied land
HeC	Hartsells fine sandy loam, 6 to 12 percent slopes
Hu	Huntington silt loam
LaA	Lanton silt loam, 0 to 2 percent slopes
LbC	Latham silt loam, 6 to 12 percent slopes
LbD	Latham silt loam, 12 to 20 percent slopes
LcE	Latham-Shelocta complex, 20 to 30 percent slopes
LcF	Latham-Shelocta complex, 30 to 60 percent slopes
Ld	Lindside silt loam
Me	Melvin silt loam
MoB	Monongahela fine sandy loam, 2 to 6 percent slopes
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MsC	Muse silt loam, 6 to 12 percent slopes
MsD	Muse silt loam, 12 to 20 percent slopes
Ne	Newark silt loam
Po	Pope loam
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SeB	Shelocta silt loam, 2 to 6 percent slopes
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SsE3	Shrouts clay, 12 to 40 percent slopes, severely eroded
St	Stendal silt loam
Su	Stendal gravelly silt loam
TrB	Trappist silt loam, 2 to 6 percent slopes
TrC	Trappist silt loam, 6 to 12 percent slopes
WhB	Whitley silt loam, 2 to 6 percent slopes
WhC	Whitley silt loam, 6 to 12 percent slopes
WhD	Whitley silt loam, 12 to 20 percent slopes
WoC	Woolper silty clay loam, 6 to 12 percent slopes

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Tunnel

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Canal lock

Located object

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions

	Large	Small
Unclassified		
Not crossable with tillage implements		
Contains water most of the time		

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 1

ESTILL AND LEE COUNTIES, KENTUCKY NO. 1

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

2 470 000 FEET

555 000 FEET

(Joins inset B)

INSET B

2 480 500 FEET

558 000 FEET

556 000 FEET

MADISON CO

KENTUCKY RIVER

RED RIVER

CLARK CO

(Joins upper right)

2 483 500 FEET

2 000 AND 3 000-FOOT GRID TICKS

INSET A

2 487 500 FEET

556 000

555 000 FEET

CLARK CO

RED RIVER

(Joins sheet 2)

2 490 500 FEET

1 000 AND 3 000-FOOT GRID TICKS

Thornsburg Band

Devils Backbone

MADISON COUNTY

KENTUCKY RIVER

THE FORKS

CLARK COUNTY

RED RIVER

Caney Branch

Palmer

(Joins sheet 2)

(Joins sheet 4)

2 485 000 FEET

545 000 FEET

AgB AgC AgD AgE AlF AlA Bu CmB CmC CoD CrF Cn Gu Hu Ld Me Mr MoB Ne Pu SrE SsE3 TrB TrC WoC FeE FeF FlB

N

1 Mile

5 000 Feet

Scale 1 : 15840

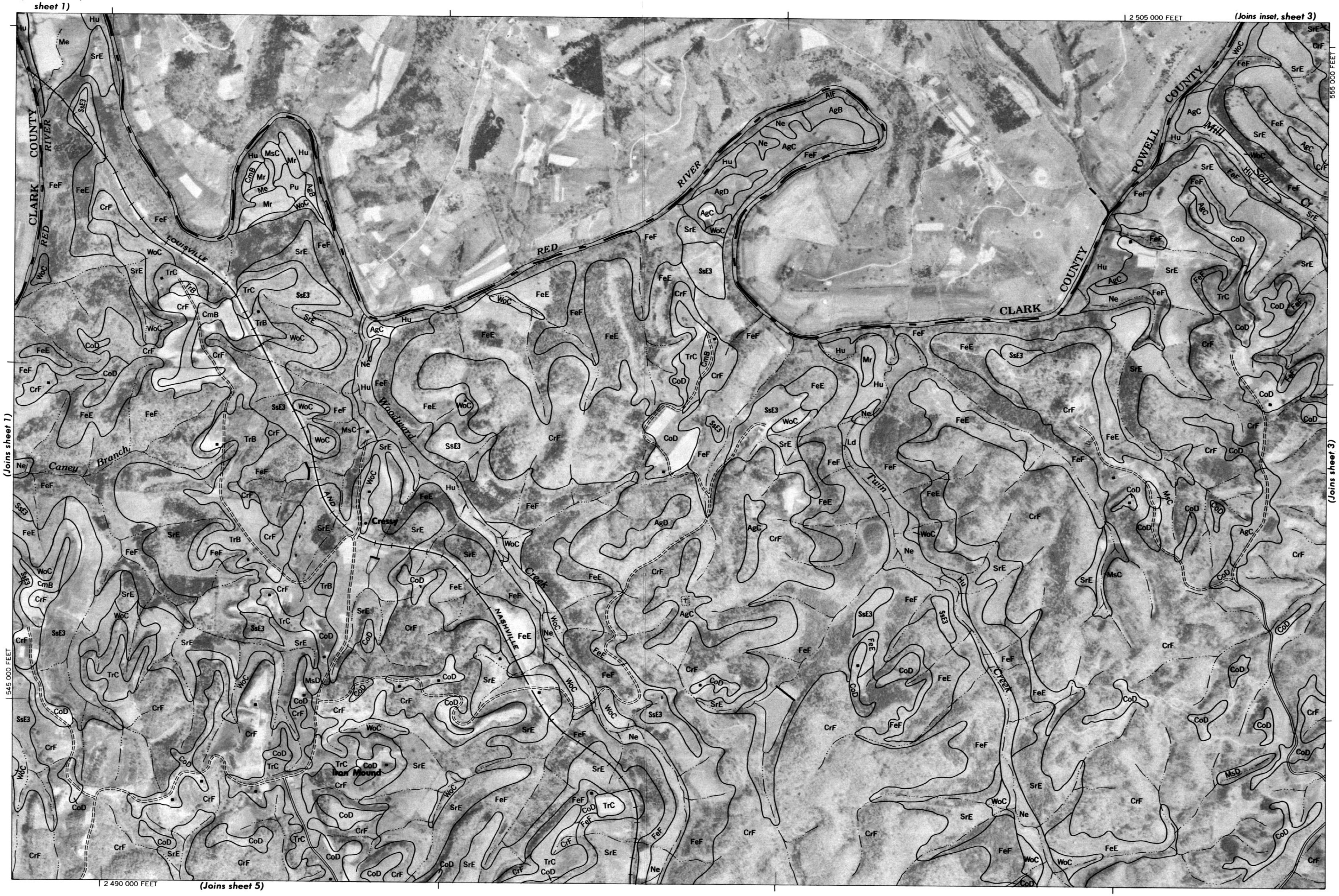
1 5 000 ¾ 4 000 ½ 3 000 ¼ 2 000 0 1 000 0

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 2

N

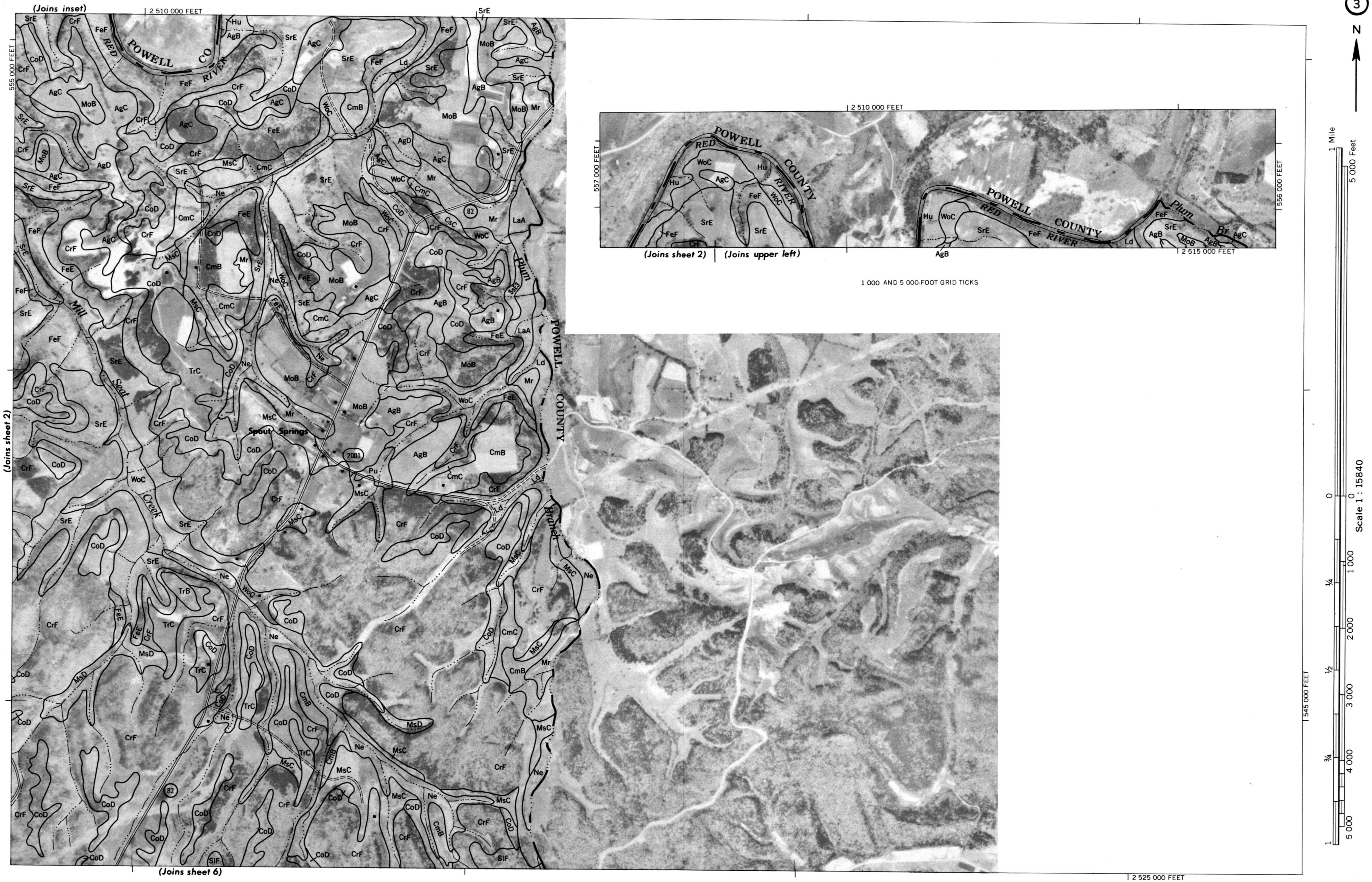
1 Mile
5 000 Feet
0
0
Scale 1 : 15840
1/4
1 000
2 000
1/2
3 000
3/4
4 000
1
5 000

(Joins inset A, sheet 1)



Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.



ESTILL AND LEE COUNTIES, KENTUCKY NO. 3

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station. Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY – SHEET NUMBER 4

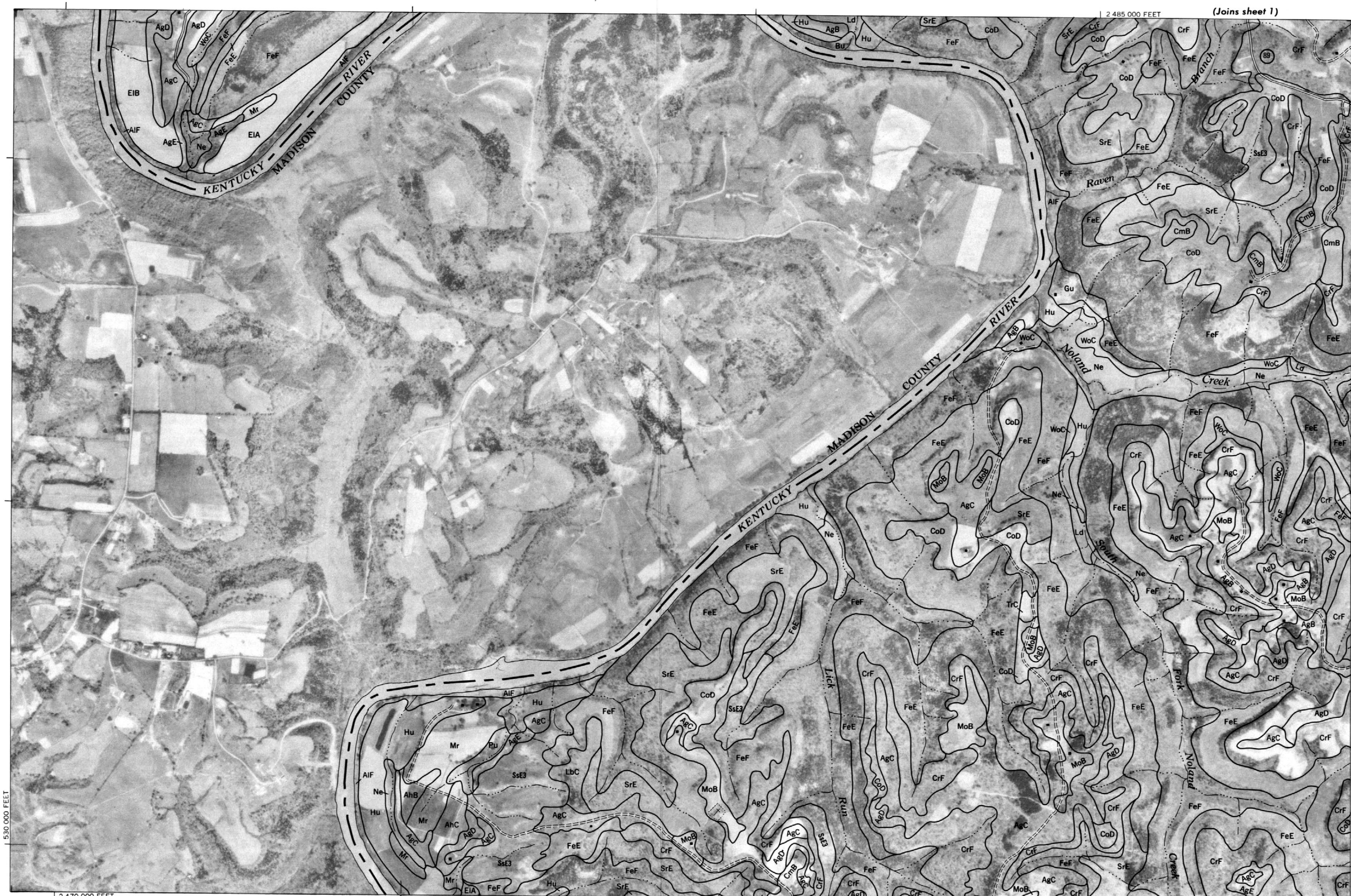
N

Scale 1:15840

1 Mile — 5 000 Feet

0 — ¼ — ½ — ¾ — 1

0 — 1 000 — 2 000 — 3 000 — 4 000 — 5 000



Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 5

ESTILL AND LEE COUNTIES, KENTUCKY NO. 5

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

2 490 000 FEET

540 000 FEET

(Joins sheet 2)

(Joins sheet 4)

(Joins sheet 6)

(Joins sheet 8)

2 505 000 FEET

530 000 FEET

5

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 0 1/4 1/2 3/4 1 000 2 000 3 000 4 000 5 000

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 6

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 3)

(Joins sheet 5)

(Joins sheet 9)

2 525 000 FEET

540 000 FEET

530 000 FEET

2 510 000 FEET

Kimbrell

Sugarloaf Mountain

Buzzard Roost

Grassy Knob

Twin Creek

Plum Br

Kueshner Br

Branch

Little Hardwicke Cr

Lick Cr

POWELL COUNTY

NAT FOREST BDY

D A N I E L B O O N E N A T I O N A L F O R E S T

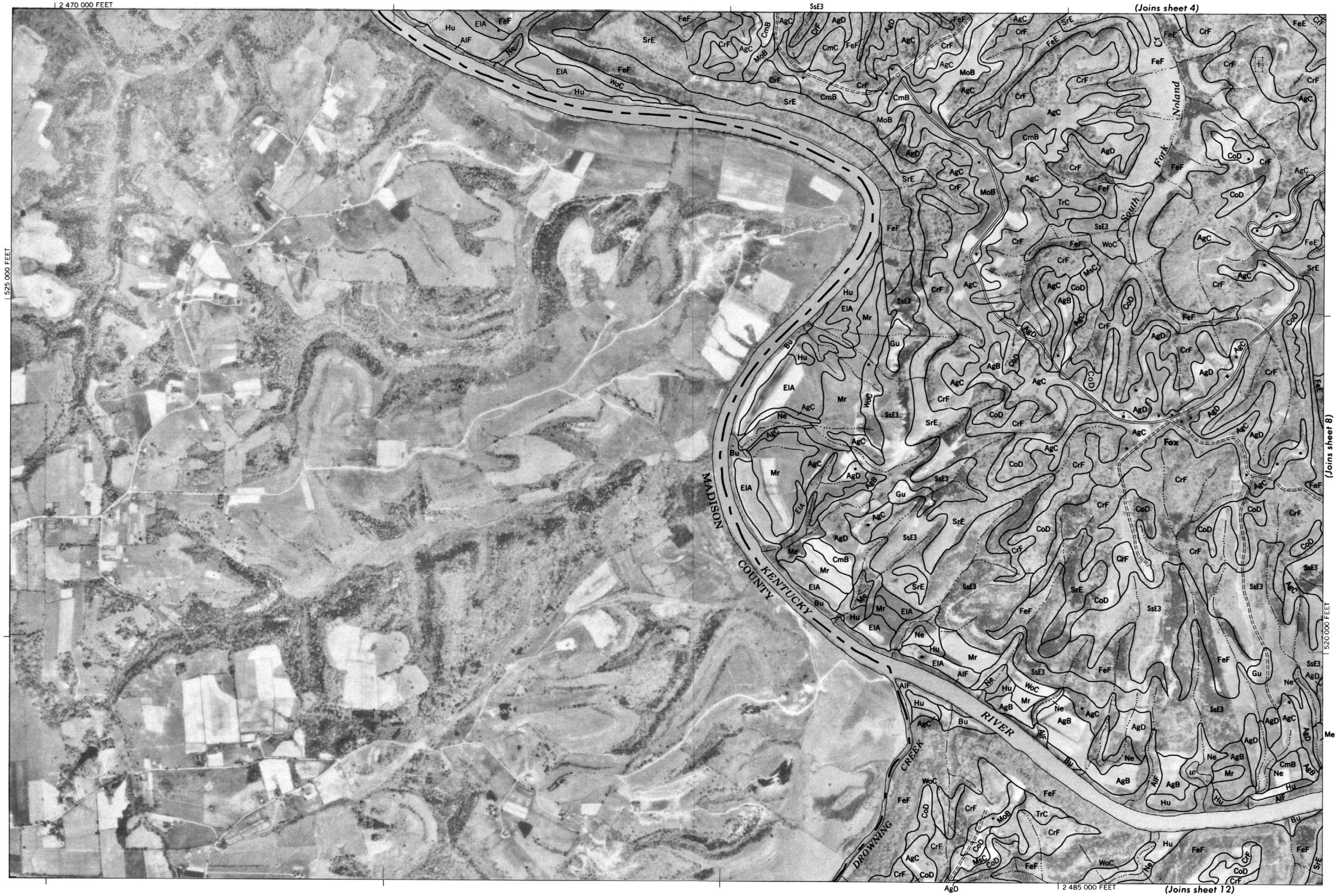
CoD CrF MsC CmB Ne SlF BoF LcF CmC Cn Mr Ld AgB CsB SrE SeD Su LbC MsD

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 6

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 7



7

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 5 000 | ¾ 4 000 | ½ 3 000 | ¼ 2 000 | 0 1 000 | 0

ESTILL AND LEE COUNTIES, KENTUCKY NO. 7

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

8

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 5 000 ¼ 1 000 ½ 2 000 ¾ 4 000 0 0

(Joins sheet 5)

(Joins sheet 7)

(Joins sheet 9)

(Joins sheet 13)

2 505 000 FEET

525 000 FEET

520 000 FEET

2 490 000 FEET

KENTUCKY RIVER

LOWER BEND

Dry Ridge

Polecat Creek

Sand Lick

Possum Run

Calloway Creek

LOUISVILLE AND NASHVILLE

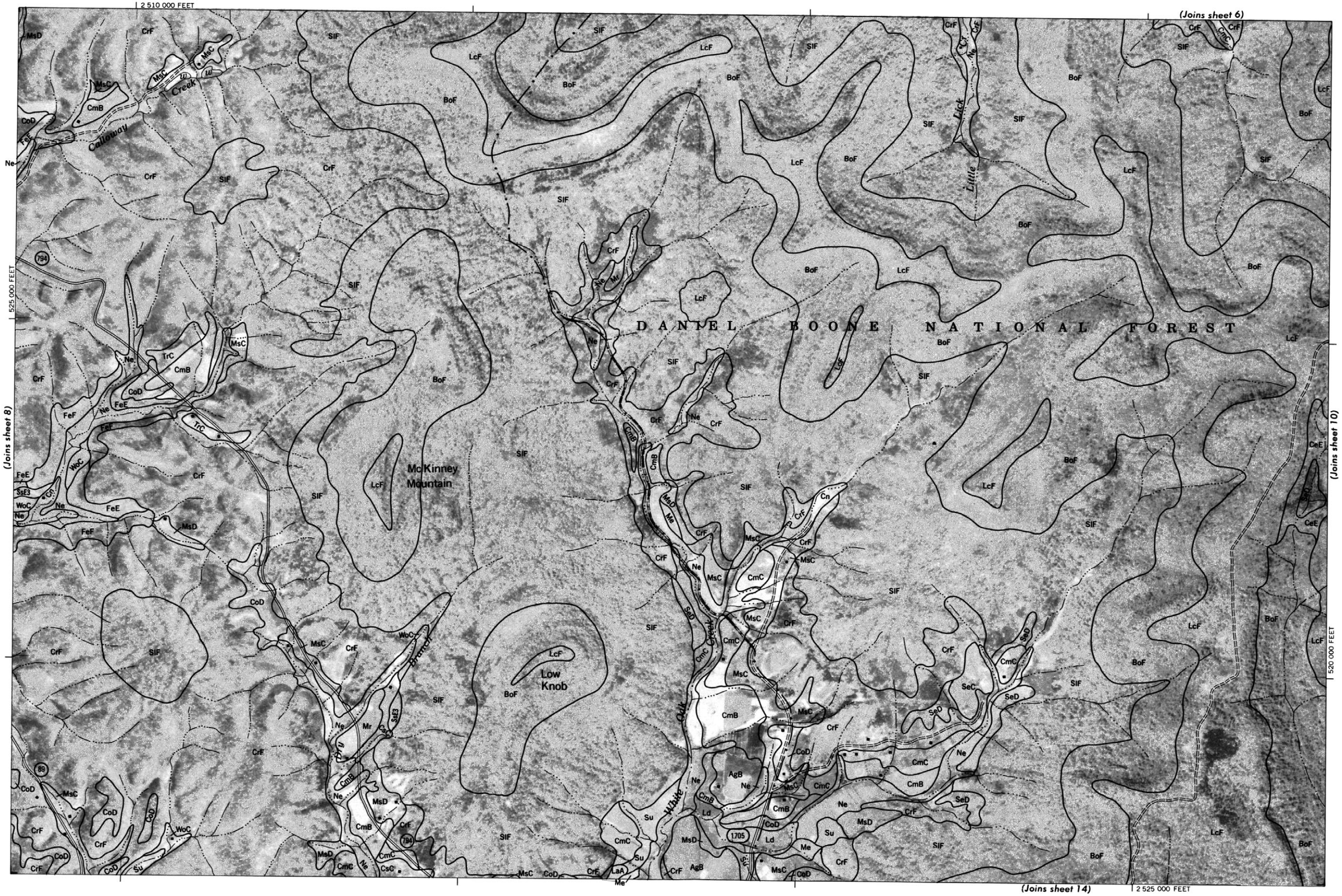
1451

89

794

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 8



This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 10

10

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

2 545 000 FEET

530 000 FEET

520 000 FEET

2 530 000 FEET

(Joins sheet 9)

(Joins sheet 15)

(Joins sheet 11)

POWELL COUNTY

DANIEL BOONE NATIONAL FOREST

Rogers Fork

Tickey Ridge

Horse Ridge

Betsy Fork

Needmore Hollow

BoF, LcF, CeE, SlF, DrC, DrD, WhC, SeD, GlE, SeC, CaD, SeB, WhD, GlD, GlC, MsC, WhB, AhC, Ne, CsB, Su, 213

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 10

ESTILL AND LEE COUNTIES, KENTUCKY NO. 11

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

11

N

2 550 000 FEET

530 000 FEET

POWELL COUNTY

213

Furnace

Park

Needmore Hollow

Furnace

DANIEL BOONE NATIONAL FOREST

(Joins sheet 10)

(Joins sheet 16)

(Joins inset, sheet)

520 000 FEET

2 565 000 FEET

1 Mile

5 000 Feet

Scale 1 : 15840

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

2 485 000 FEET

515 000 FEET

505 000 FEET

2 470 000 FEET

(Joins sheet 7)

(Joins sheet 13)

(Joins sheet 19)

MADISON COUNTY

DROWNING CREEK

Rock Lick

Trotting Ridge

Bittig Run

Winston

1354

1353

52

Hu Ld EIA WoC AgB AgC AgD AgE CrF CoD FeF FeE SrE SsE3 TrB TrC LbC MsC MsD Ne CmB

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 13

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

13

N

1 Mile
5 000 Feet

Scale 1 : 15840

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 15

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

2 530 000 FEET

515 000 FEET

(Joins sheet 10)

(Joins sheet 14)

(Joins sheet 16)

(Joins sheet 22)

2 545 000 FEET

505 000 FEET

15

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 0 5 000

¼ 1 000

½ 2 000

¾ 3 000

4 000

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 16

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 16

ESTILL AND LEE COUNTIES, KENTUCKY – SHEET NUMBER 17

17

N

(Joins inset, sheet 18)

2 570 000 FEET

515 000 FEET

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 24)

2 585 000 FEET

505 000 FEET

Woodward Creek

Mountain Chapel

POWELL COUNTY

ESTILL COUNTY

LEE COUNTY

DANIEL BOONE NATIONAL FOREST

Burns Fork

Billey Fork

OIL FIELD

OIL WELLS

1036

CaD

CeE

Ld

1 Mile

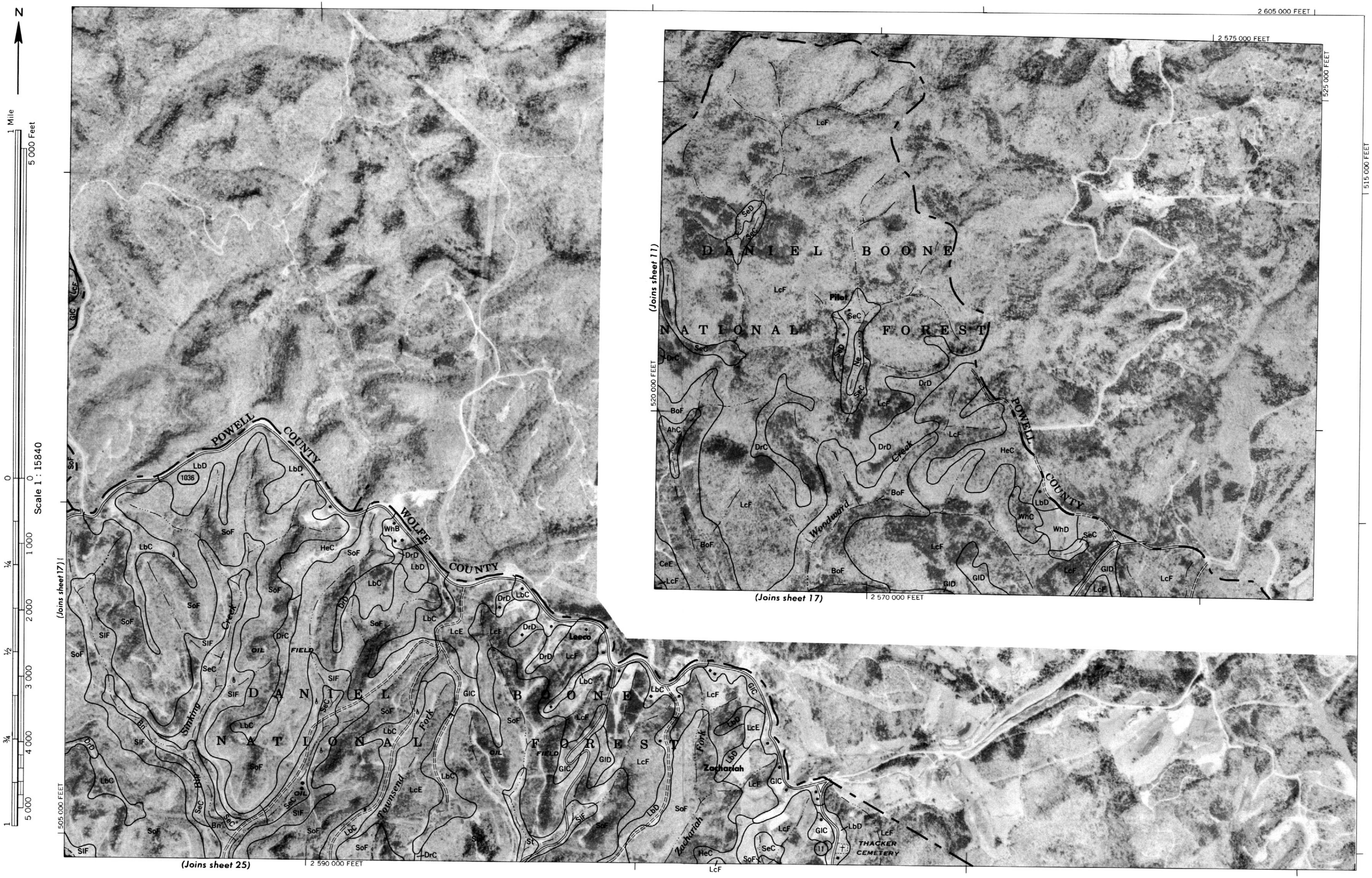
5 000 Feet

Scale 1 : 15840

ESTILL AND LEE COUNTIES, KENTUCKY NO. 17

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 18



Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 18

ESTILL AND LEE COUNTIES, KENTUCKY NO. 19

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

2 470 000 FEET

500 000 FEET

(Joins sheet 12)

(Joins sheet 20)

(Joins sheet 27)

2 485 000 FEET

Winston

DROWNING CREEK

MADISON COUNTY

Black Branch

DROWNING CREEK

SsE3 WoC CsC FeE TrB CoD FeF Hu LaA Ne CrF TrC CmB AgC MoB MsD MsC AgD AgB Mr SrE

19

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 5 000 ¾ 4 000 ½ 3 000 ¼ 2 000 0 1 000 0

20

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 13)

(Joins sheet 19)

(Joins sheet 21)

(Joins sheet 28)

2 505 000 FEET

500 000 FEET

495 000 FEET

2 490 000 FEET

Rice Station

Clear Creek

West Irvine

Pea Ridge School

Pea Ridge

Wisemantown

Winn

Hows Fork

Dug Hill

Crooked Creek

Camp Creek

Station Creek

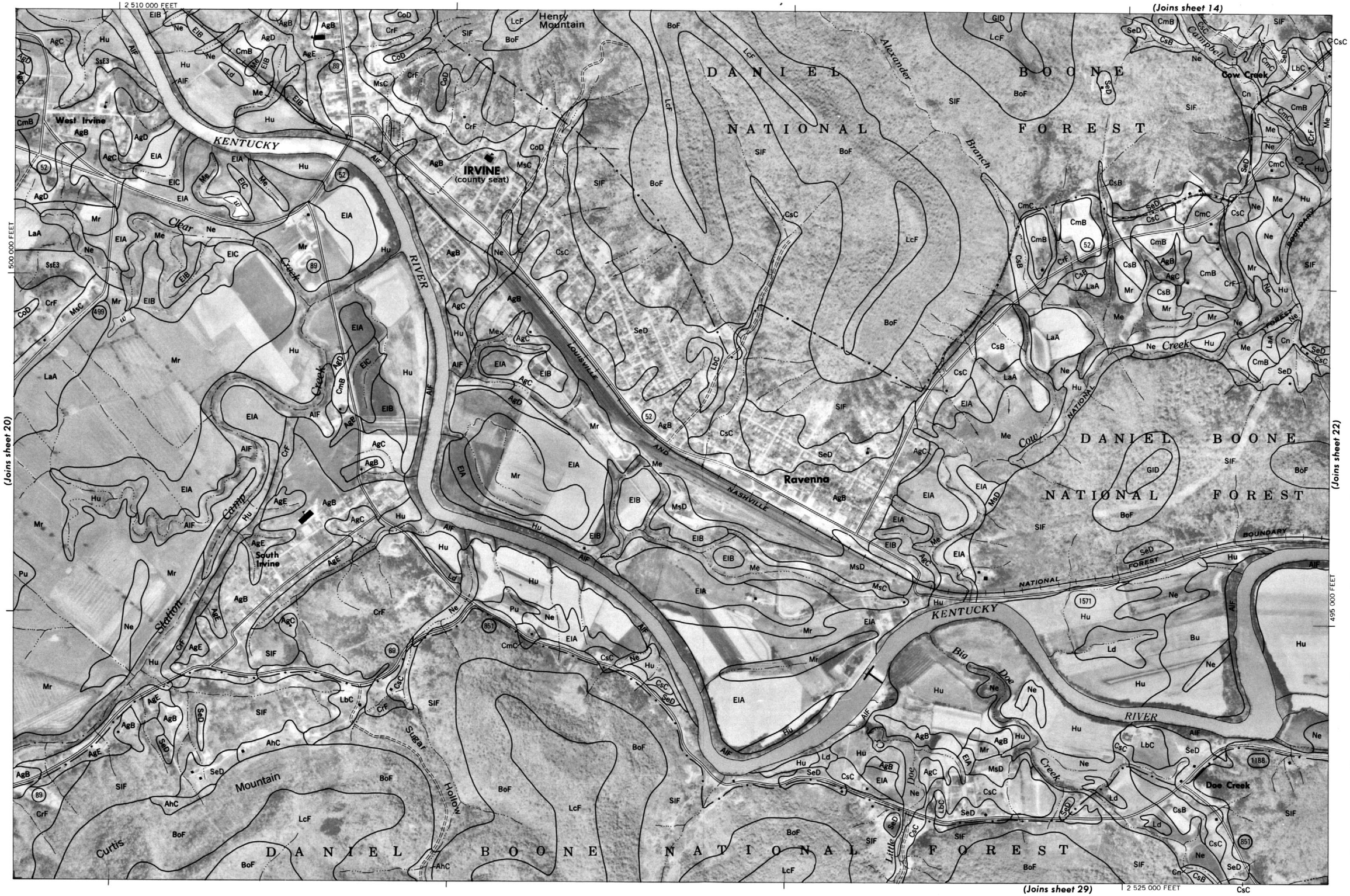
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

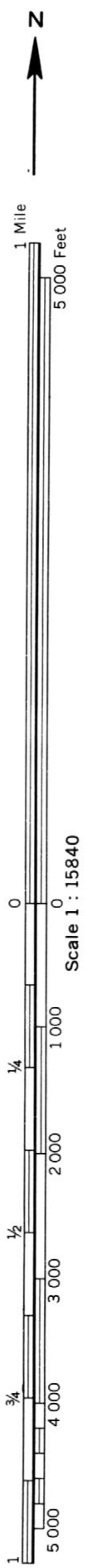
ESTILL AND LEE COUNTIES, KENTUCKY NO. 20

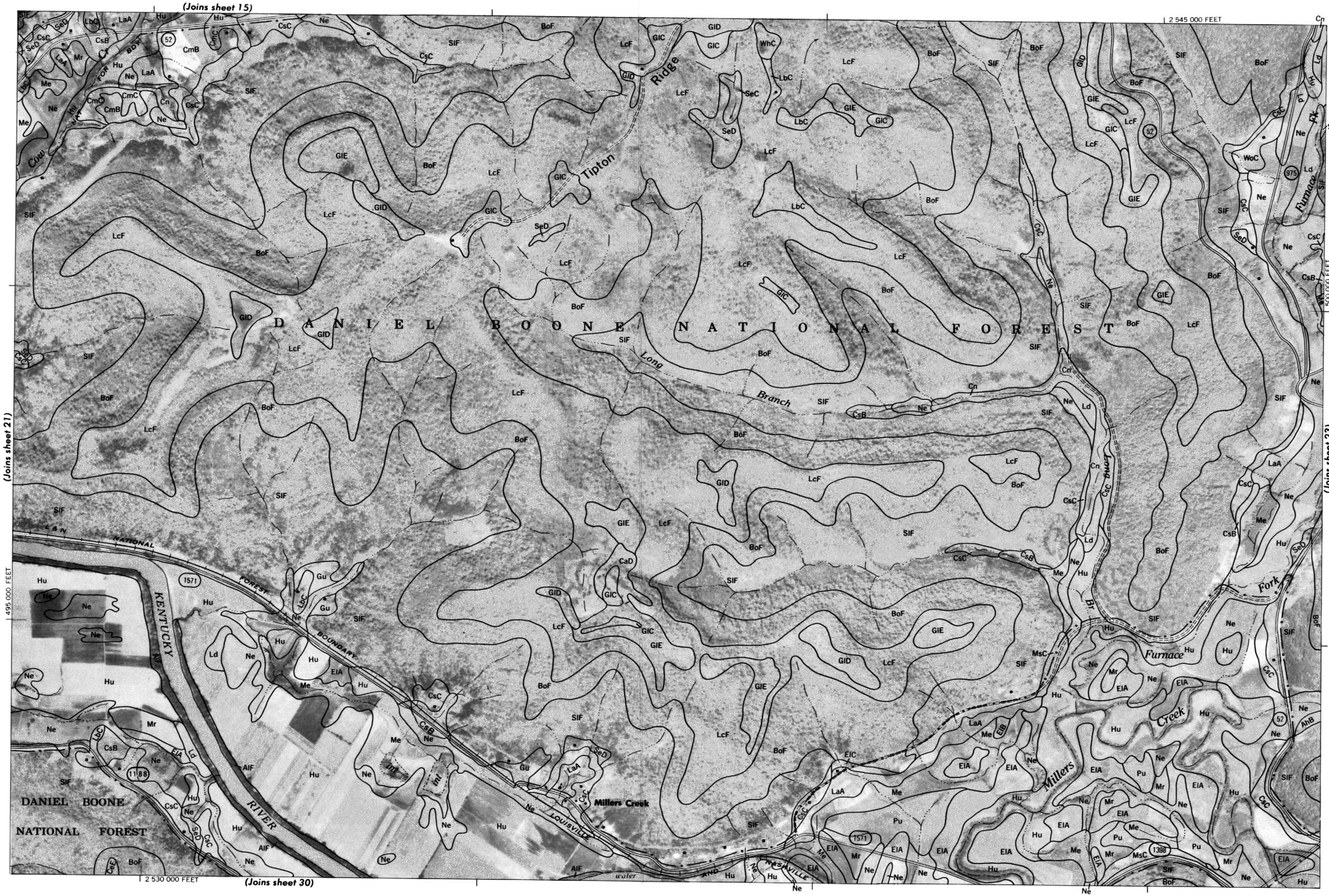
ESTILL AND LEE COUNTIES, KENTUCKY NO. 21

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.



(22)





Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 23

ESTILL AND LEE COUNTIES, KENTUCKY NO. 23

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 24

N

Scale 1:15840

1 Mile — 5 000 Feet — 0 — ¼ — ½ — ¾ — 1

0 — 1000 — 2000 — 3000 — 4000 — 5000

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 24

ESTILL AND LEE COUNTIES, KENTUCKY NO. 25
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

26

N

1 Mile

5 000 Feet

Scale 1 : 15840

2 625 000 FEET

505 000 FEET

495 000 FEET

(Joins sheet 25)

(Joins sheet 34)

2 610 000 FEET

DANIEL BOONE NATIONAL FOREST

WOLFE COUNTY

Walker Creek

2016

LcE LbC SoF LcF GlC SeD SeC St Bu LbD GlD

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO 26

ESTILL AND LEE COUNTIES, KENTUCKY NO. 27

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

28

N

1 Mile

5 000 Feet

Scale 1 : 15840

(Joins sheet 20)

(Joins sheet 27)

(Joins sheet 29)

(Joins sheet 37)

2 505 000 FEET

490 000 FEET

480 000 FEET

2 490 000 FEET

Crooked Creek

Crooked Creek

Hinton Branch

Camp Creek

Station Creek

Peter Mountain

Noland

1139

499

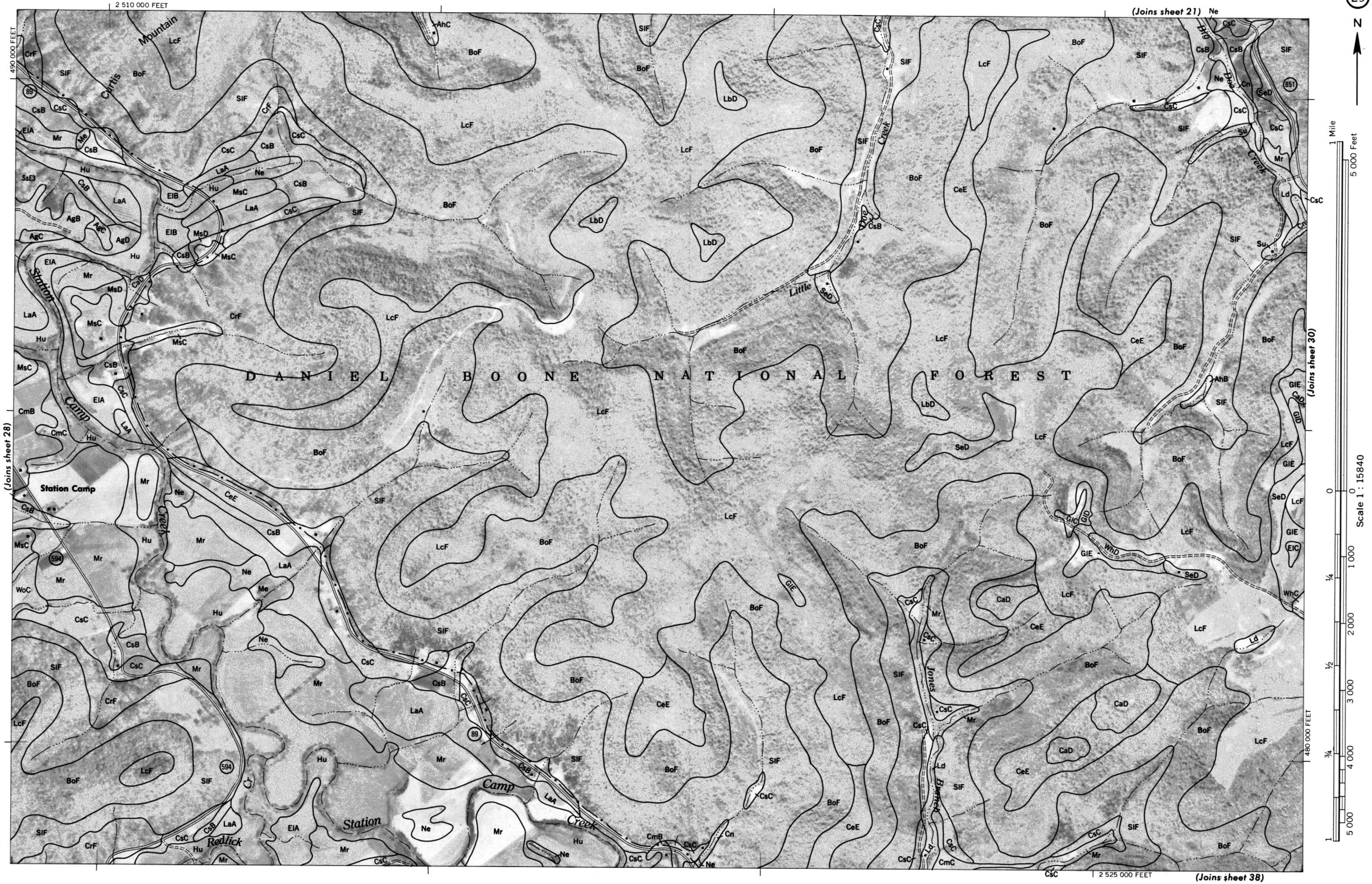
594

LaA

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 28



ESTILL AND LEE COUNTIES, KENTUCKY NO. 29

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the Kentucky Agricultural Experiment Station. Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 30

30

N

1 Mile

5 000 Feet

Scale 1 : 15840

(Joins sheet 22)

(Joins sheet 29)

(Joins sheet 39)

(Joins sheet 31)

2 545 000 FEET

490 000 FEET

480 000 FEET

2 530 000 FEET

DANIEL BOONE NATIONAL FOREST

KENTUCKY RIVER

Miller's Creek

Big Doe Creek

Pryse

Texola

Shade

Grace Chapel

Buck

1188 1571 1398 851

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 30

ESTILL AND LEE COUNTIES, KENTUCKY NO. 31

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 24)

(Joins sheet 31)

(Joins sheet 41)

(Joins sheet 33)

2 585 000 FEET

490 000 FEET

480 000 FEET

2 570 000 FEET

DANIEL BOONE NATIONAL FOREST

White Creek

Hollow

Cold Oak Creek

Cane Fork

Sinking Creek

Branch

Cave

Armine

Little Sinking

Big Sinking

Bald Rock Fork

Spring Hauk

Town Hollow

Hatton Hollow

Big Branch

Hollow

1036

52

498

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

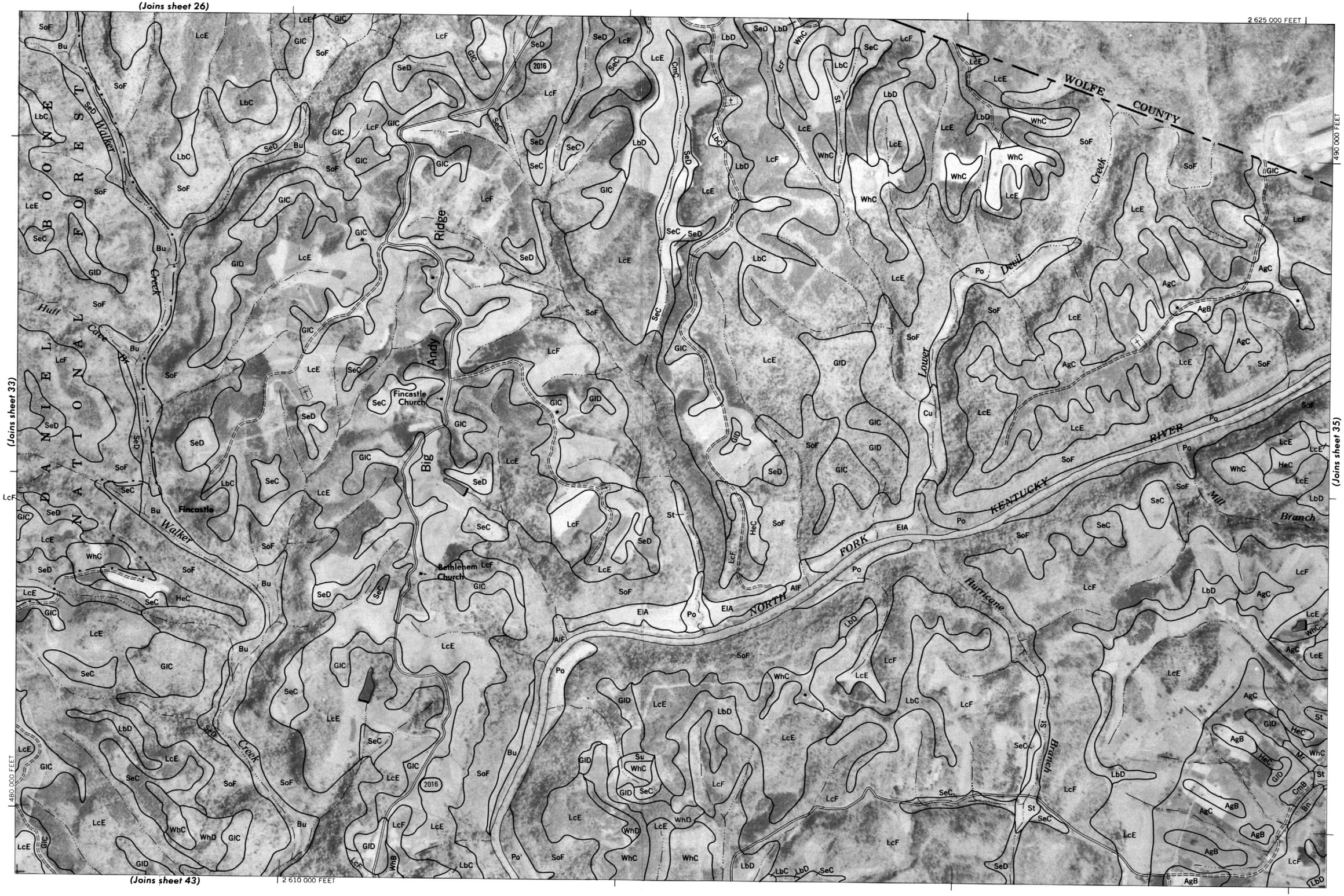
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 33
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

N

1 Mile
5 000 Feet

Scale 1 : 15840

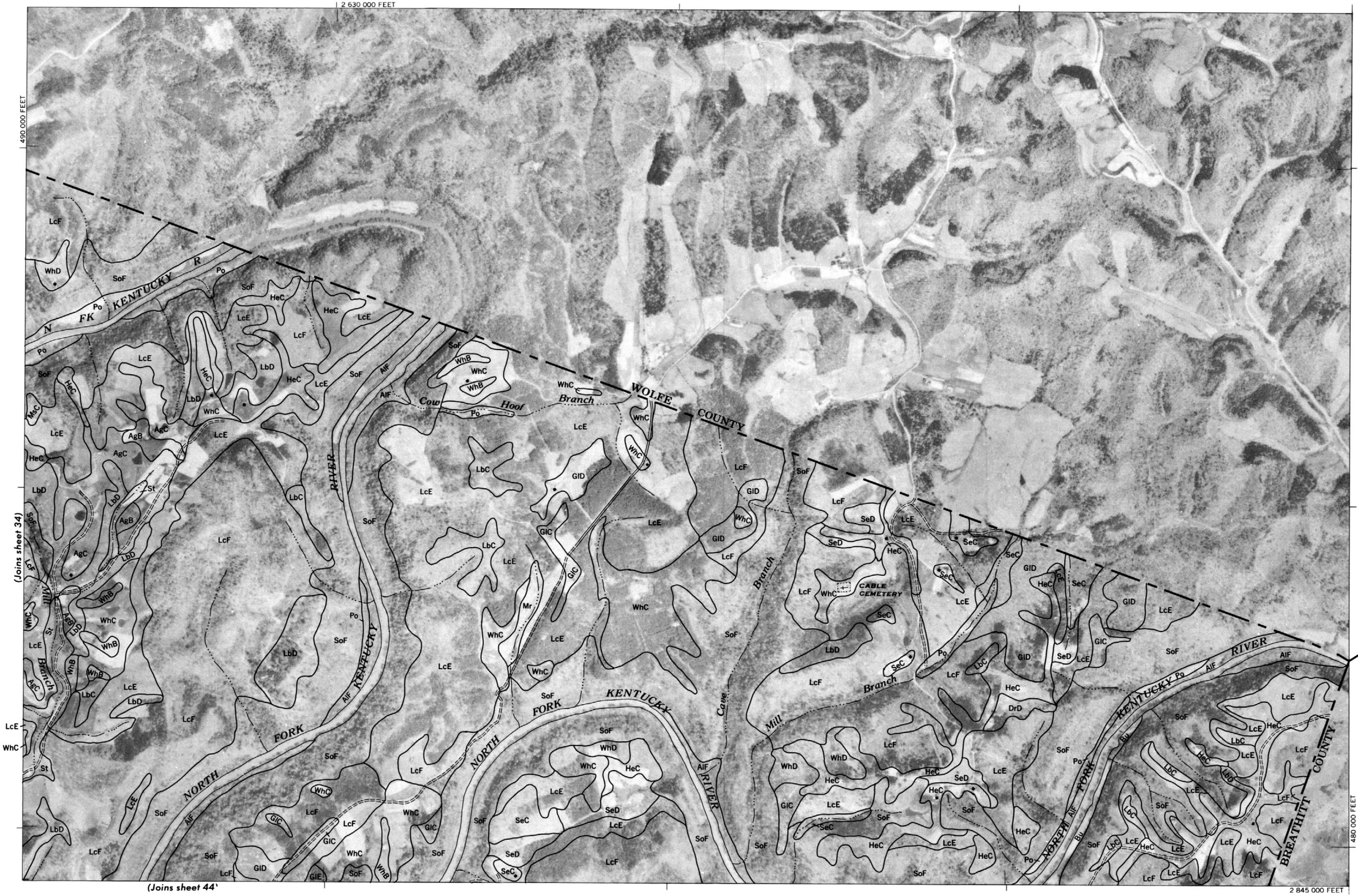


Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 34

ESTILL AND LEE COUNTIES, KENTUCKY NO. 35

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.



35

N

1 Mile
5 000 Feet

Scale 1 : 15840

0 1/4 1/2 3/4 1
0 1 000 2 000 3 000 4 000 5 000

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 37

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

N

Scale 1 : 15840

1 Mile 5 000 Feet

0 0

1/4 1 000

1/2 2 000

3/4 3 000

1 4 000

5 000

(Joins sheet 29)

(Joins sheet 37)

(Joins sheet 39)

(Joins sheet 47)

2 525 000 FEET

2 510 000 FEET

475 000 FEET

470 000 FEET

DANIEL BOONE NATIONAL FOREST

Wagersville

Wilson Mountain

Red Lick Creek

Camp Station Creek

Jones Branch

Scrivner Branch

Edwards Branch

Happy Top Mountain

Middle Fork Camp Creek

Napper Hollow

Camp Creek Forest Boundary

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 39

39

N

2 530 000 FEET

475 000 FEET

470 000 FEET

2 545 000 FEET

(Joins sheet 30)

(Joins sheet 38)

(Joins sheet 40)

(Joins sheet 48)

DANIEL BOONE NATIONAL FOREST

Barnes Mountain

Scrutner Br

Walnut Gap School

Buck Creek

Macedonia Church

Leighton

Evelyn

Searcy Station

Camp Cr

Searcy Branch

KENTUCKY RIVER

ESTILL CO

LEE CO

ESTILL - LEE COUNTY

LEE - ESTILL COUNTY

Ross

851

1209

1 Mile

5 000 Feet

Scale 1 : 15840

0 5 000 1 000 0 2 000 ¼ 4 000 ½ 3 000 ¾ 1

ESTILL AND LEE COUNTIES, KENTUCKY NO. 39

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 ¼ ½ ¾ 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 31)

(Joins sheet 39)

(Joins sheet 49)

(Joins sheet 41)

2 565 000 FEET

475 000 FEET

470 000 FEET

2 550 000

ESTILL COUNTY

LEE COUNTY

KENTUCKY RIVER

LOUISVILLE AND NASHVILLE

Pinnacle

Ross Creek School

Ross Creek

Little Willow Branch

Willow Branch

DANIEL BOONE NATIONAL FOREST

1036

399

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 41

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

2 570 000 FEET

475 000 FEET

(Joins sheet 32)

(Joins sheet 40)

(Joins sheet 42)

(Joins sheet 50)

2 585 000 FEET

470 000 FEET

DANIEL BOONE NATIONAL FOREST

PINE CREST YOUTH CAMP

Bear Track Lookout Tower

Mt Olive Church

Mt Olive

OIL FIELD

BEATTY PLACE CEMETERY

Contrary Creek

Spruce Fork

Middle Fork

Right Fork

Silver Creek

Scale 1 : 15840

1 Mile

5 000 Feet

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 43

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

43

N

1 Mile
5 000 Feet

Scale 1 : 15840

(44)

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 0 1/4 1/2 3/4 1

1 000 2 000 3 000 4 000 5 000

(Joins sheet 35)

(Joins sheet 43)

(Joins sheet 53)

2 645 000 FEET

1 475 000 FEET

470 000 FEET

2 630 000 FEET

NORTH FORK KENTUCKY RIVER

Glen Eden Community Center

Williba

Fillmore

Branch

Creek

Brush Creek

BREATHITT COUNTY

709

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 44

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 45

45

N

2 470 000 FEET

460 000 FEET

455 000 FEET

2 485 000 FEET

(Joins sheet 36)

(Joins sheet 46)

DANIEL BOONE NATIONAL FOREST

MADISON COUNTY

JACKSON COUNTY

INDEFINITE BOUNDARY

Beaver Pond Church

Locust Branch

Red Lick Creek

Campbell Br

Long Br

Kissey Branch

BoF CeE CaD SlF CsB CsC CmB CmC Ld Ne Hu Mr CrF LaA Cn Me LcE LcF TrC TrB MsC MsD SeD SeC SrE GlE Gu

1 Mile

5 000 Feet

Scale 1 : 15840

0 0 1/4 1 000 1/2 2 000 3/4 3 000 1 4 000 5 000

ESTILL AND LEE COUNTIES, KENTUCKY NO. 45

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 46

N

Scale 1 : 15840

1 Mile, ¾, ½, ¼, 0

5 000 Feet, 4 000, 3 000, 2 000, 1 000, 0

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 47

47

N

2 510 000 FEET

465 000 FEET

(Joins sheet 38)

(Joins sheet 46)

(Joins Sheet 48)

455 000 FEET

2 525 000 FEET

D A N I E L B O O N E N A T I O N A L F O R E S T

JACKSON COUNTY

BOUNDARY INDEFINITE

Alumbaugh

SPARKS CEMETERY

Drip Rock

Elk Branch

Middle Fork

Camp Creek

Station Camp Creek

Sparks Branch

1209

89

1 Mile

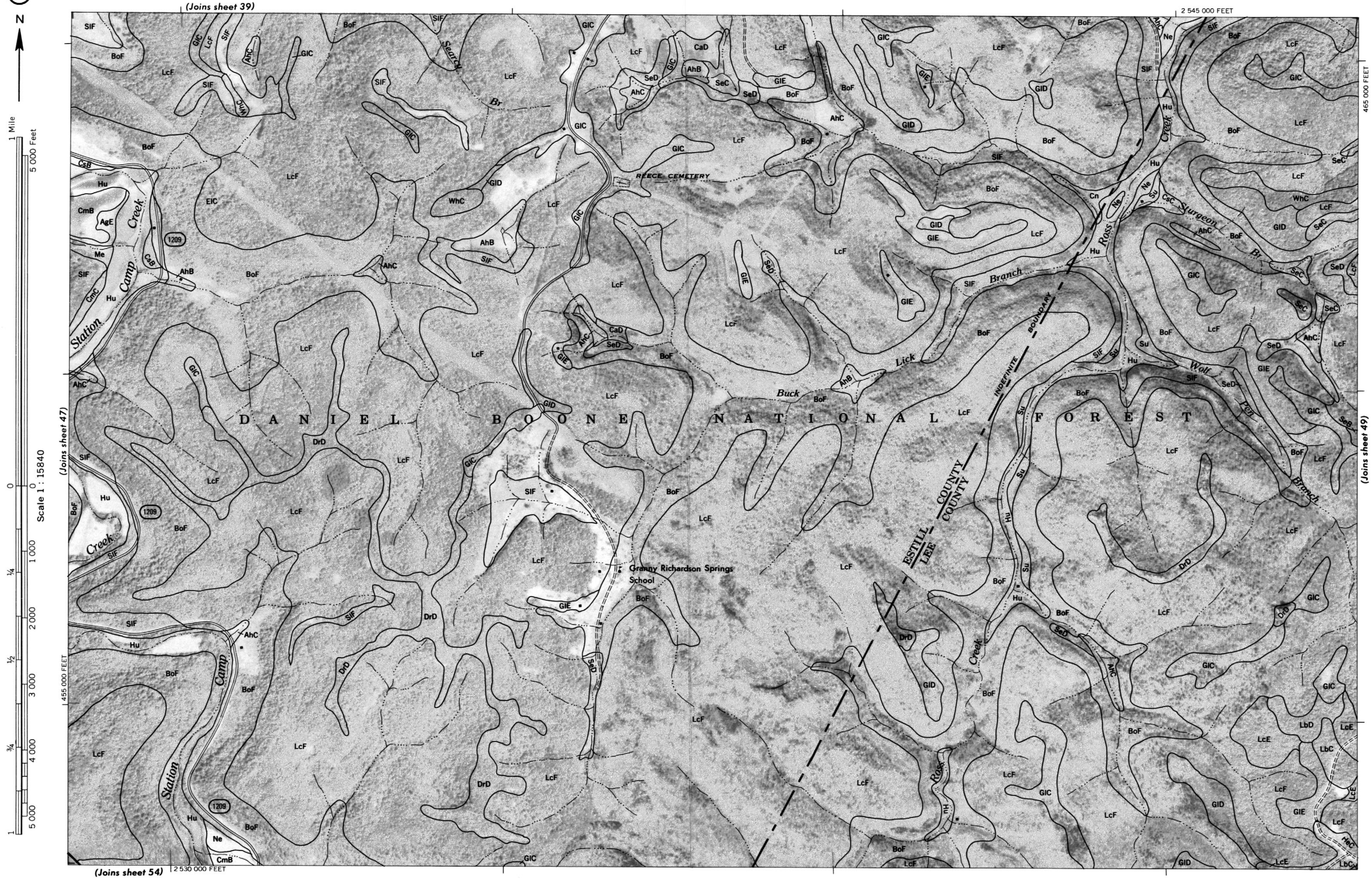
5 000 Feet

Scale 1 : 15840

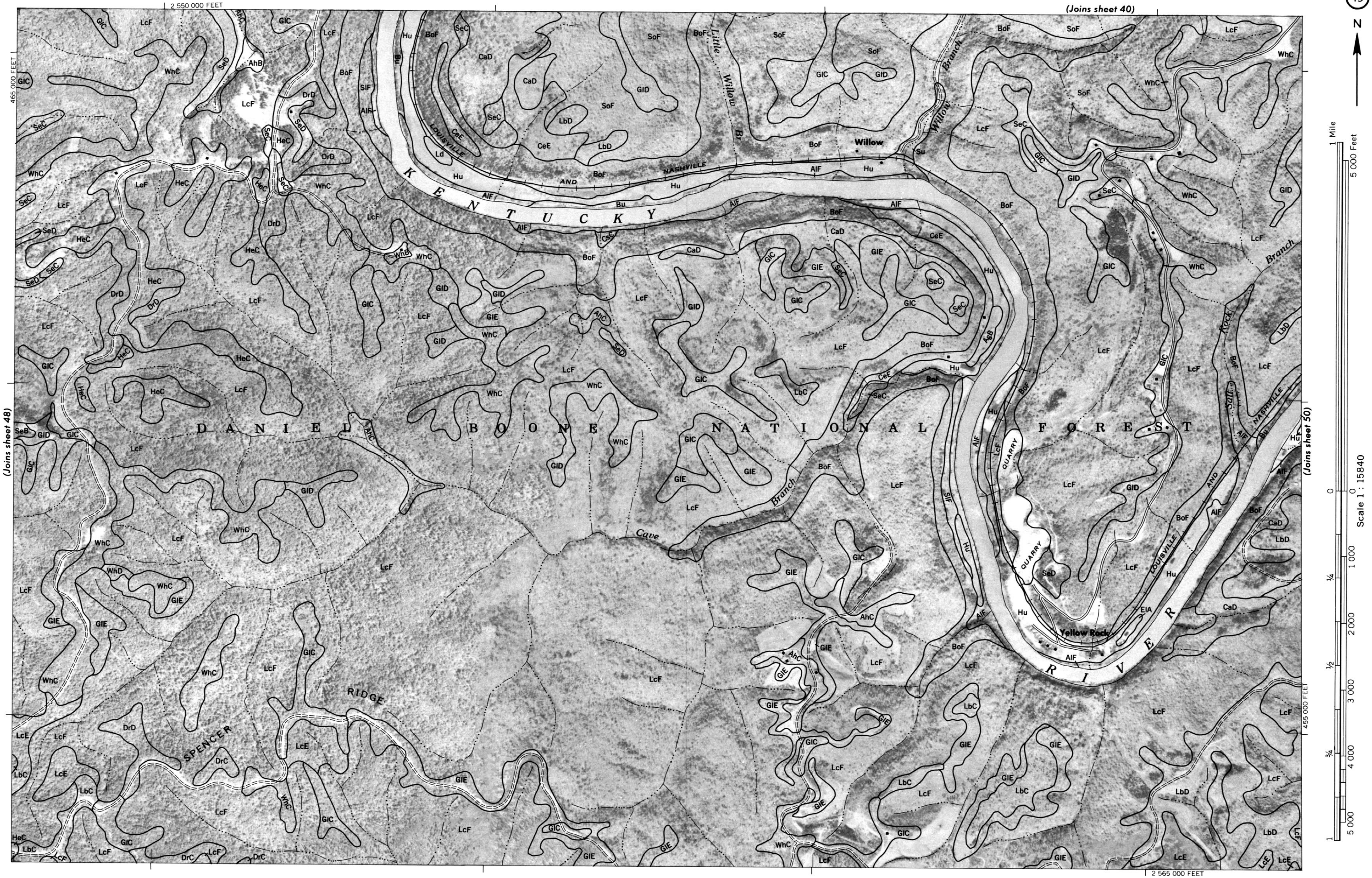
ESTILL AND LEE COUNTIES, KENTUCKY NO. 47

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.



Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.



ESTILL AND LEE COUNTIES, KENTUCKY NO. 49
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

ESTILL AND LEE COUNTIES, KENTUCKY — SHEET NUMBER 50

50

N

(Joins sheet 41)

2 585 000 FEET

465 000 FEET

DANIEL BOONE NATIONAL FOREST

St Therese Church

Salt Rock Branch

Spruce Fk Middle Fork Contrary Creek

Right Fork Mikes Branch

QUILLAN CEMETERY

Belle Point

Dirksen Branch

KENTUCKY RIVER

NASHVILLE AND LOUISVILLE

(Joins sheet 49)

(Joins sheet 56)

2 570 000 FEET

455 000 FEET

(Joins sheet 51)

1 Mile

5 000 Feet

Scale 1 : 15840

1 5 000 0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 50

ESTILL AND LEE COUNTIES, KENTUCKY NO. 51
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

52

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 1/4 1/2 3/4 1

0 1 000 2 000 3 000 4 000 5 000

(Joins sheet 43)

(Joins sheet 51)

(Joins sheet 53)

(Joins sheet 58)

2 625 000 FEET

465 000 FEET

455 000 FEET

2 610 000 FEET

St Helens

Monica

Tyler Tunnel

Tallega

Dunigan

Big Branch

Cabin Creek

Double Creek

Long Shoot

Coal Branch

Little Bear Creek

Bear Creek

MIDDLE FORK KENTUCKY RIVER

NASHVILLE AND LOUISVILLE

Horseshoe Bend

KENTUCKY RIVER

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 53

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

(Joins sheet 44)

2 630 000 FEET

465 000 FEET

(Joins sheet 52)

(Joins sheet 59)

455 000 FEET

2 645 000 FEET

53

N

Canyon Falls

Bear Creek

Chapmans Fork

Twin Cr

Lower

BREATHITT COUNTY

LEE AND ESTILL COUNTIES

1 Mile

5 000 Feet

Scale 1 : 15840

N

1 Mile

5 000 Feet

Scale 1 : 15840

0 0

¼ 1 000

½ 2 000

¾ 3 000

1 4 000

5 000

2 545 000 FEET

(Joins sheet 48)

440 000 FEET

450 000 FEET

2 530 000 FEET

(Joins sheet 55)

(Joins sheet 60)

DANIEL BOONE NATIONAL FOREST

INDEFINITE BOUNDARY

COUNTY

COUNTY

COUNTY

JACKSON

ESTILL

LEE

Ross

Mountain

Brushy

Grassy

Upper Sinking Creek

Upper Sinking Creek Fork

Grassy Fork

1209

BoF CmB AhC Hu GlC DrD LcF SlF Su LbD LbC LcE HeC WhC WhB WhD SeC SeD MsC GID LcD

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 55

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

55

N

1 Mile
5 000 Feet

Scale 1 : 15840
0 1/4 1/2 3/4 1
0 1 000 2 000 3 000 4 000 5 000

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 0 0 5 000 | ¾ 4 000 | ½ 3 000 | ¼ 2 000 | 0 1 000

(Joins sheet 50)

(Joins sheet 55)

(Joins sheet 57)

(Joins sheet 62)

2 585 000 FEET

2 570 000 FEET

445 000 FEET

450 000 FEET

Heidelburg

Lock No. 14

Short Hollow

Dirksen Br

Little Creek

Smith Branch

Duck Fork

Wills Branch

Long Br

KENTUCKY RIVER

LOUISVILLE AND NASHVILLE

STURGEON BOY FOR NAT

DANIEL BOONE NATIONAL FOREST

OIL FIELD

OIL FIELD

BRANDENBURG CEMETERY

KEARNEY CEMETERY

South Side School

Congleton Church

LcF LbD LbC LcE GlD GlC GlE WhC WhD WhB SeC SeD SlF EIA EIB Bu Po Cu Cn St AgC AgD Bn HeC

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 57

This map is one or a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

57

(Joins sheet 56)

(Joins sheet 51)

(Joins sheet 58)

(Joins sheet 63)

2 590 000 FEET

450 000 FEET

445 000 FEET

2 605 000 FEET

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 5 000 ¾ 4 000 ½ 3 000 ¼ 2 000 0 1 000 0

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 0 5 000 | ¾ 4 000 | ½ 3 000 | ¼ 2 000 | 0 1 000 | 0

2 625 000 FEET

450 000 FEET

445 000 FEET

2 610 000 FEET

(Joins sheet 52)

(Joins sheet 57)

(Joins sheet 59)

(Joins sheet 64)

OWSLEY COUNTY

Long Shoal Church

Tallega Mission Sch

Lone

Long Shoal Branch

Paupaw Creek

Wolfpen Branch

Lymans Creek

KENTUCKY RIVER

MIDDLE FK

SeC LcF LcE GlD LbC LbD Cn AhB St SeD GlC SIF Su SeB AgB AgC AgD EIB Cu EIC 708

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 59

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

(Joins sheet 53)

2630 000 FEET

450 000 FEET

(Joins sheet 58)

(Joins inset, sheet 64)

445 000 FEET

2 645 000 FEET

59

N

1 Mile

5 000 Feet

Scale 1 : 15840

1 ¾ ½ ¼ 0 0 ¼ ½ ¾ 1

5 000 4 000 3 000 2 000 1 000 0

60

N

1 Mile

5 000 Feet

Scale 1 : 15840

2 545 000 FEET

(Joins sheet 54)

435 000 FEET

(Joins sheet 61)

430 000 FEET

2 530 000 FEET

DANIEL BOONE NATIONAL FOREST

JACKSON COUNTY

OWSLEY COUNTY

Arvel

Cooperas Cave Branch

INDEFINITE BOUNDARY

1209

587

LcE LcF HeC WhC GlE Po WhB GlD LbC DrD SeD LbD WhD CmB MsD SeB GlC DrC

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 60

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.
Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

(Joins sheet 55)
(Joins sheet 60)
(Joins sheet 62)
(Joins inset, sheet 63)

2 550 000 FEET
435 000 FEET
430 000 FEET
2 565 000 FEET

61

N

1 Mile
5 000 Feet

Scale 1 : 15840

N

1 Mile

5 000 Feet

Scale 1 : 15840

(Joins sheet 56)

(Joins sheet 61)

(Joins sheet 63)

2 585 000 FEET

440 000 FEET

430 000 FEET

2 570 000 FEET

DANIEL BOONE NAT FOR

HAMILTON CEMETERY

Delvinta Church

Ida May Branch

Willis Branch

Rockhouse Barker Big Stonecoal Br

Kelly Br

Duck Cn

Elk Lick Cn

Fork

OWSLEY COUNTY

OWSLEY COUNTY

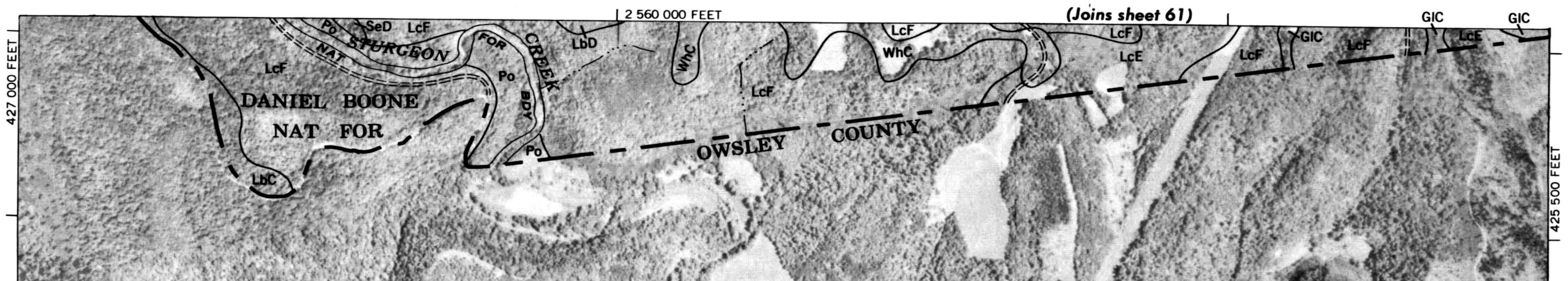
LcF LcE GlD GlC WhD WhB WhC LbD LbC SeD SeC SeB Cn Su St Po Ne Mr

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

63

N



1 500 AND 5 000-FOOT GRID TICKS

2 605 000 FEET

1 Mile | 5 000 Feet | 0 | ¼ | ½ | ¾ | 1 | 0 | 1 000 | 2 000 | 3 000 | 4 000 | 5 000

Scale 1 : 15840

ESTILL AND LEE COUNTIES, KENTUCKY NO. 63

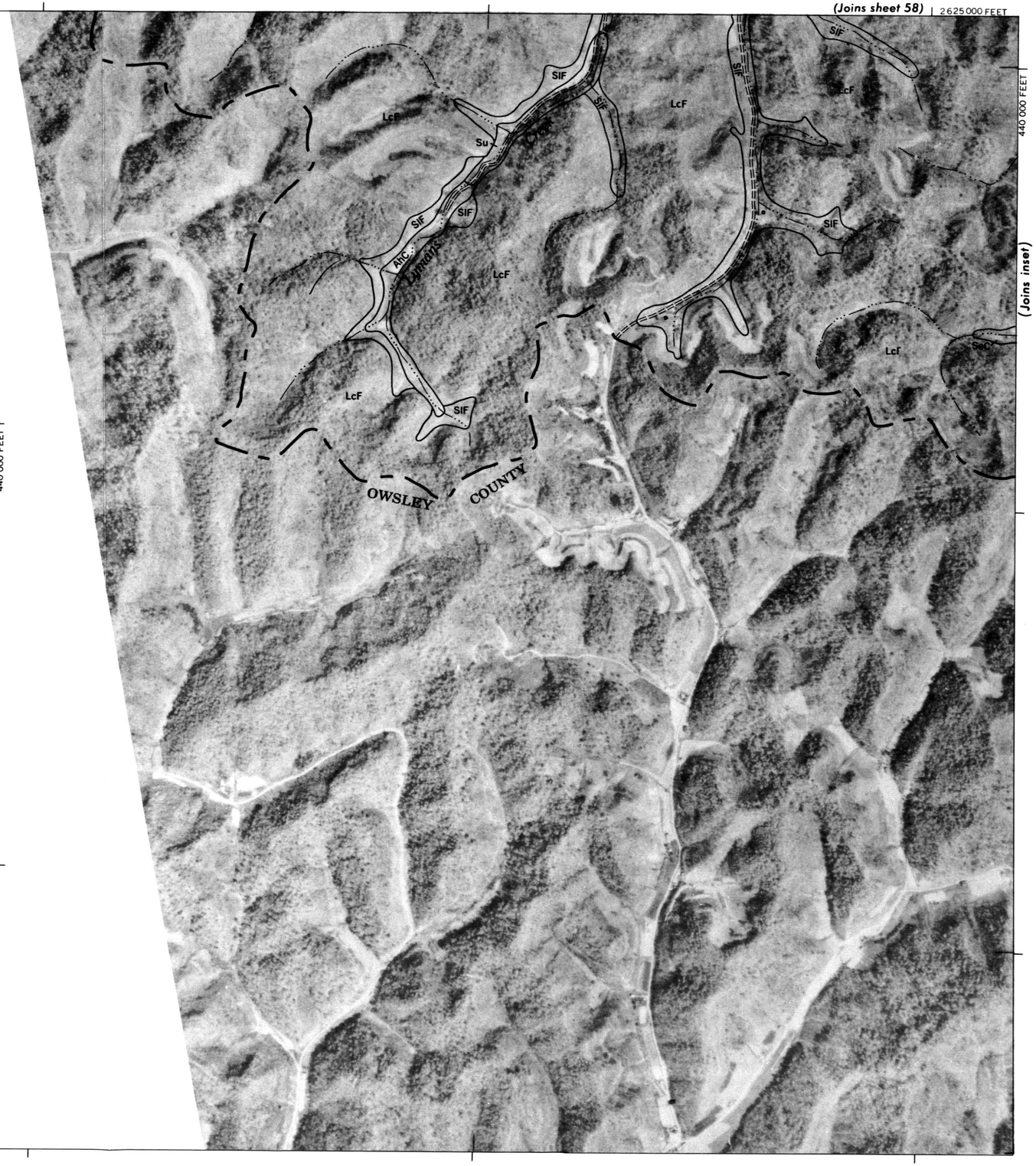
This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station. Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

N

1 Mile 5 000 Feet

Scale 1 : 15840

0 0 ¼ 1 000 ½ 2 000 ¾ 4 000 1 5 000



430 000 FEET

2 610 000 FEET

Photobase from 1969 aerial photography. Positions of 5,000-foot grid ticks are approximate and based on the Kentucky coordinate system, south zone.

This map is one of a set compiled in 1972 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service and Forest Service, and the Kentucky Agricultural Experiment Station.

ESTILL AND LEE COUNTIES, KENTUCKY NO. 64